Order No: MAC0112083C2

Service Manual

Room Air Conditioner

CS-E9BKP CU-E9BKP5 / CS-E12BKP CU-E12BKP5

Panasonic
INVERTER

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⚠ **WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

⚠ **PRECAUTION OF LOW TEMPERATURE**

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigeration circuit.

1. Features

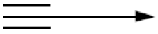
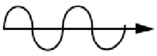
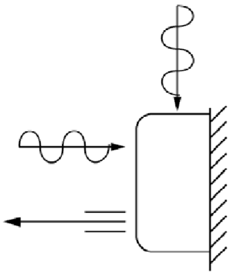
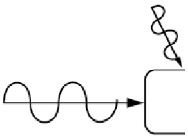
- Product
- Microcomputer-controlled compressor operating frequency
- Vertical and Horizontal Airflow Directions

- **Five modes of operation selection**
- **Power Mode operation**
- **Sleep Mode operation**
- **Delay ON Timer and OFF Timer**
- **Standby operation**
- **Remote Controller with illuminable buttons**
- **Power Monitor Display LED**
- **Catechin Air Purifying Filter**
- **Solar Refreshing Deodorizing Filter**
- **Serviceability**
- **Washable Front Panel**
- **Breakdown Self Diagnosis function**
- **Environmental Protection**
- **Non-ozone depletion substances refrigerant (R410A)**
- **Quality Improvement**
- **Gas leakage detection**
- **Deice operation**
- **Auto restart control**

2. Functions

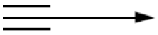
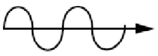
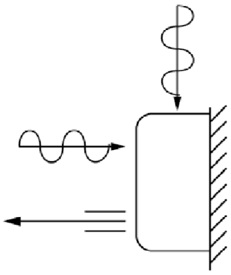
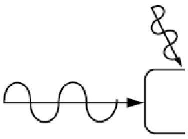
3. Product Specifications

	Unit	CS-E9BKP	CU-E9B
Cooling Capacity	kW kcal/h	2.6 (0.60 - 3.00) 2,240 (520 - 2,580)	
Heating Capacity	kW kcal/h	3.6 (0.60 - 5.00) 3,100 (520 - 4,300)	
Moisture Removal	l/h Pint/h	1.6 (3.4)	
Power Source	Phase V Cycle	Single 230 50	

Airflow Method		OUTLET  INTAKE 	SIDE VIEW 	TOP VI 
Air Volume	Indoor Air (Lo)	m3/min (cfm)	Cooling; 6.5 (231) Heating; 7.1 (249)	—
	Indoor Air (Me)	m3/min (cfm)	Cooling; 8.1 (286) Heating; 8.8 (312)	—
	Indoor Air (Hi)	m3/min (cfm)	Cooling; 9.9 (350) Heating; 10.6 (374)	—
Noise Level		dB (A)	Cooling; High 39, Low 26 Heating; High 40, Low 27	Cooling Heating
		Power level dB	Cooling; High 50 Heating; High 51	Cooling; H Heating; H
Electrical Data	Input	W	Cooling; 700 (115 - 880) Heating; 900 (110 - 1,400)	
	Running Current	A	Cooling; 3.3 Heating; 4.0	
	EER	W/W (kcal/hw)	Cooling; 3.71(3.20)	
	COP	W/W (kcal/hw)	Heating; 4.00 (3.44)	
	Starting Current	A	4.00	
Piping Connection Port (Flare piping)		inch inch	G ; Half Union 3/8” L ; Half Union 1/4”	G ; 3-way va L ; 2-way va

Pipe Size			inch	G (gas side) ; 3/8”	G (gas side
(Flare piping)			inch	L (liquid side) ; 1/4”	L (liquid sid
Drain	Inner diameter		mm	12	—
Hose	Length		m	0.7	—
Power Cord Length				2.1 m	—
Number of core-wire				3 core wires × 1.0 mm^2	—
Dimensions	Height		inch (mm)	10 - 31/32 (275)	21 - 9/32
	Width		inch (mm)	31 - 15/32 (799)	27 - 17/32
	Depth		inch (mm)	7 - 27/32 (210)	11 - 7/32
Net Weight			lb (kg)	20 (9.0)	77 (35
Compressor		Type		—	Involute s
	Motor	Type		—	Brushless (
	Rated	Output	W	—	700
Air Circulation		Type		Cross-flow Fan	Propeller
		Material		AS + Glass Fiber 20%	P.P
	Motor	Type		Transistor (4-poles)	Induction (6
		Input	W	—	61.3
		Rate Output	W	30	25
	Fan Speed	Lo (Cool/ Heat)	rpm	800 / 840	—
		Me (Cool/ Heat)	rpm	1,000 / 1,040	—
		Hi (Cool/ Heat)	rpm	1,200 / 1,270	770
Heat Exchanger	Description			Evaporator	Conden
	Tube material			Copper	Coppe
	Fin material			Aluminium	Alumini
	Fin Type			Slit Fin	Corrugate
	Row / Stage			(Plate fin configuration, forced dra	
				2 / 15	1 / 20
	FPI			21	19
	Size (W × H × L)		mm	610 × 315 × 25.4	732.1 × 50
Refrigerant Control Device				—	Capillary
Refrigeration Oil			(c.c)	—	RB68A (
Refrigerant (R-22)			g (oz)	—	840 (29
Thermostat				Electronic Control	—
Protection Device				Electronic Control	Electronic (
Capillary Tube	Length		mm	—	C1, C2 ; 1,100
	Flow Rate		l/min	—	C1, C2 ; 5.0,
	Inner Diameter		mm	—	C1, C2 ; 1.2,
Air Filter	Material			P.P.	—
	Style			Honeycomb	
Fan Motor Capacitor			μ F, VAC	—	1.8 μ F, 40

- Specifications are subject to change without notice for further improvement.

		Unit	CS-E12BKP	CU-E12E
Cooling Capacity		**kW** **kcal/h**	**3.45 (0.60 - 4.00)** **2,970 (520 - 3,440)**	
Heating Capacity		**kW** **kcal/h**	**4.80 (0.60 - 6.50)** **4,130 (520 - 5,590)**	
Moisture Removal		**l/h** **Pint/h**	**2.0** **(4.2)**	
Power Source		**Phase** **V** **Cycle**	**Single** **230** **50**	
Airflow Method		**OUTLET**  **INTAKE** 	**SIDE VIEW** 	**TOP VI** 
Air Volume	**Indoor Air (Lo)**	**m3/min** **(cfm)**	**Cooling; 7.3 (258)** **Heating; 9.2 (325)**	**—**
	Indoor Air (Me)	**m3/min** **(cfm)**	**Cooling; 9.2 (323)** **Heating; 10.3 (360)**	**—**
	Indoor Air (Hi)	**m3/min** **(cfm)**	**Cooling; 10.9 (384.4)** **Heating; 11.8 (416.5)**	**—**
Noise Level		**dB (A)**	**Cooling; High 42, Low 29** **Heating; High 42, Low 33**	**Cooling** **Heating; 50**

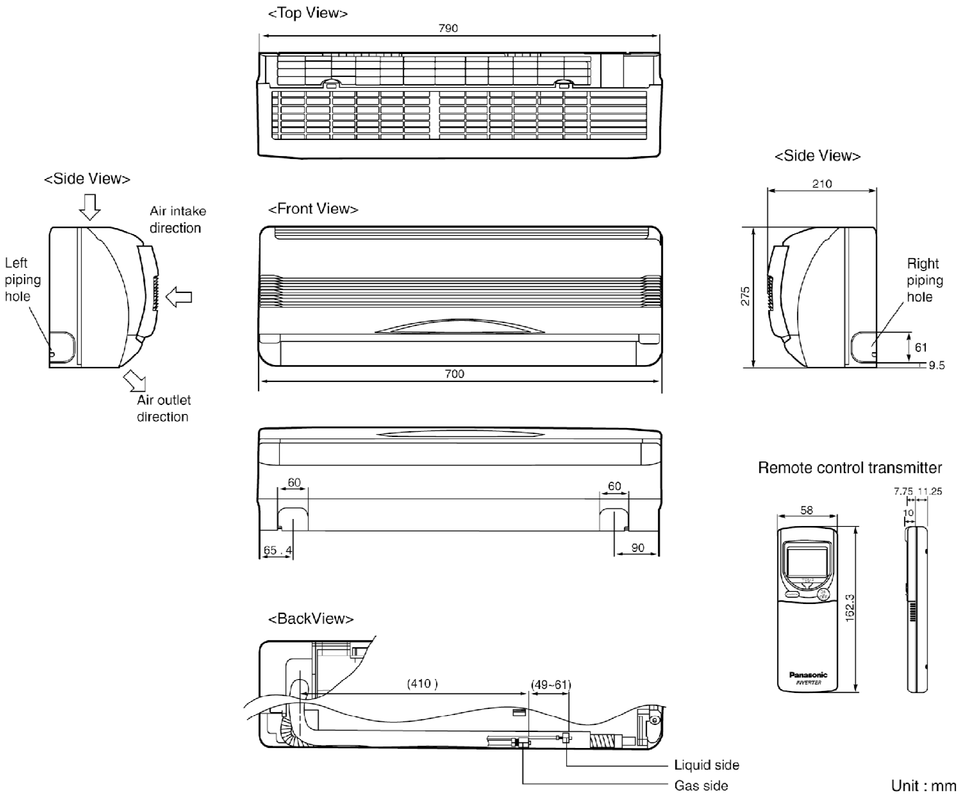
			Power level dB	Cooling; High 53 Heating; High 53	Cooling; H Heating; H
Electrical Data	Input		W	Cooling; 950 (120 - 1,280) Heating; 1,260 (115 - 1,890)	
	Running Current		A	Cooling; 4.4 Heating; 5.6	
	EER		W/W (kcal/hw)	Cooling; 3.63 (3.13)	
	COP		W/W (kcal/hw)	Heating; 3.81 (3.28)	
	Starting Current		A	5.60	
Piping Connection Port (Flare piping)			inch inch	G ; Half Union 1/2” L ; Half Union 1/4”	G ; 3-way va L ; 2-way va
Pipe Size (Flare piping)			inch inch	G (gas side) ; 1/2” L (liquid side) ; 1/4”	G (gas side L (liquid sid
Drain	Inner diameter		mm	12	—
Hose	Length		m	0.7	—
Power Cord Length Number of core-wire				2.1 m 3 core wires × 1.5 mm2	— —
Dimensions	Height		inch (mm)	10 - 31/32 (275)	21 - 9/32
	Width		inch (mm)	31 - 15/32 (799)	27 - 17/32
	Depth		inch (mm)	7 - 27/32 (210)	11 - 7/32
Net Weight			lb (kg)	20 (9.0)	81.6 (3
Compressor		Type		—	Involute
	Motor	Type		—	Brushless (
	Rated	Output	W	—	700
Air Circulation		Type		Cross-flow Fan	Propelle
		Material		AS + Glass Fiber 20%	P.P
	Motor	Type		Transistor (4-poles)	Induction (
		Input	W	—	65.9
		Rate Output	W	30	29
	Fan Speed	Lo (Cool/Heat)	rpm	880 / 1,100	—
		Me (Cool/Heat)	rpm	1,100 / 1,230	—
		Hi (Cool/Heat)	rpm	1,310 / 1,410	830

Heat Exchanger	**Description**		**Evaporator**	**Conden**
	Tube material		**Copper**	**Copp**
	Fin material		**Aluminium**	**Alumini**
	Fin Type		**Slit Fin**	**Corrugate**
	Row / Stage		**(Plate fin configuration, forced dr**	
			2 / 15	**2 / 2**
	FPI		**21**	**17**
	Size (W × H × L)	**mm**	**610 × 315 × 25.4**	**703.8 × 5 735.0**
Refrigerant Control Device			**—**	**Capillary**
Refrigeration Oil		**(c.c)**	**—**	**RB68A (**
Refrigerant (R410A)		**g (oz)**	**—**	**1,020 (3**
Thermostat			**Electronic Control**	**—**
Protection Device			**Electronic Control**	**Electronic**
Capillary Tube	**Length**	**mm**	**—**	**C1, C2 ; 1,100**
	Flow Rate	**l/min**	**—**	**C1, C2 ; 5.0,**
	Inner Diameter	**mm**	**—**	**C1, C2 ; 1.2,**
Air Filter	**Material**		**P.P.**	**—**
	Style		**Honeycomb**	
Fan Motor Capacitor		**µ F, VAC**	**—**	**2.0 µ F, 4**

- Specifications are subject to change without notice for further improvement.

4. Dimensions

CS-E9BKP / CS-E12BKP


<Top View>
790
<Side View>
Air intake direction
Left piping hole
Air outlet direction
<Front View>
700
<Side View>
210
275
Right piping hole
61
9.5
60
60
65.4
90
Remote control transmitter
58
162.3
7.75
11.25
10
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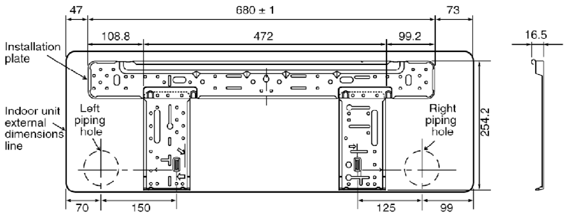
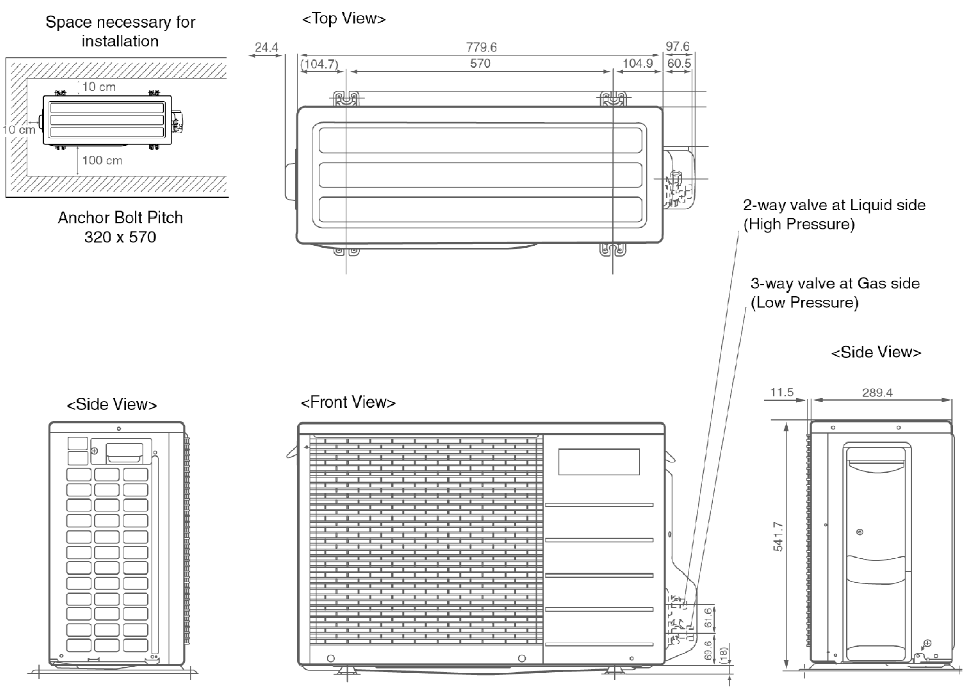
<BackView>
(410)
(49~61)
Liquid side
Gas side
Unit : mm

Relative position between the indoor unit and the installation plate <Front View>


47
680 ± 1
73
108.8
472
99.2
16.5
Installation plate
Indoor unit external dimensions line
Left piping hole
Right piping hole
254.2
70
150
125
99

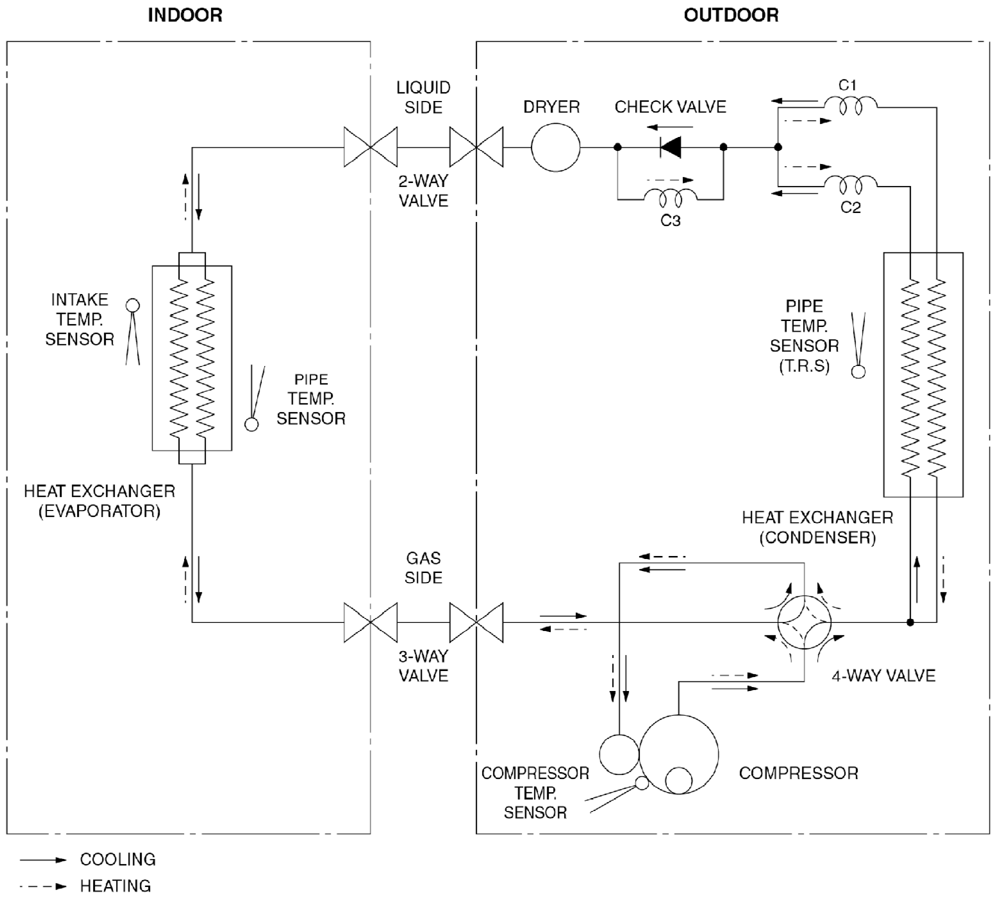
CU-E9BKP5 / CU-E12BKP5


Space necessary for installation
10 cm
10 cm
100 cm
Anchor Bolt Pitch 320 x 570
<Top View>
24.4
779.6
97.6
(104.7)
570
104.9
60.5
2-way valve at Liquid side (High Pressure)
3-way valve at Gas side (Low Pressure)
<Side View>
<Front View>
<Side View>
11.5
289.4
541.7
61.6
69.6
(18)

Unit: mm

5. Refrigeration Cycle Diagram

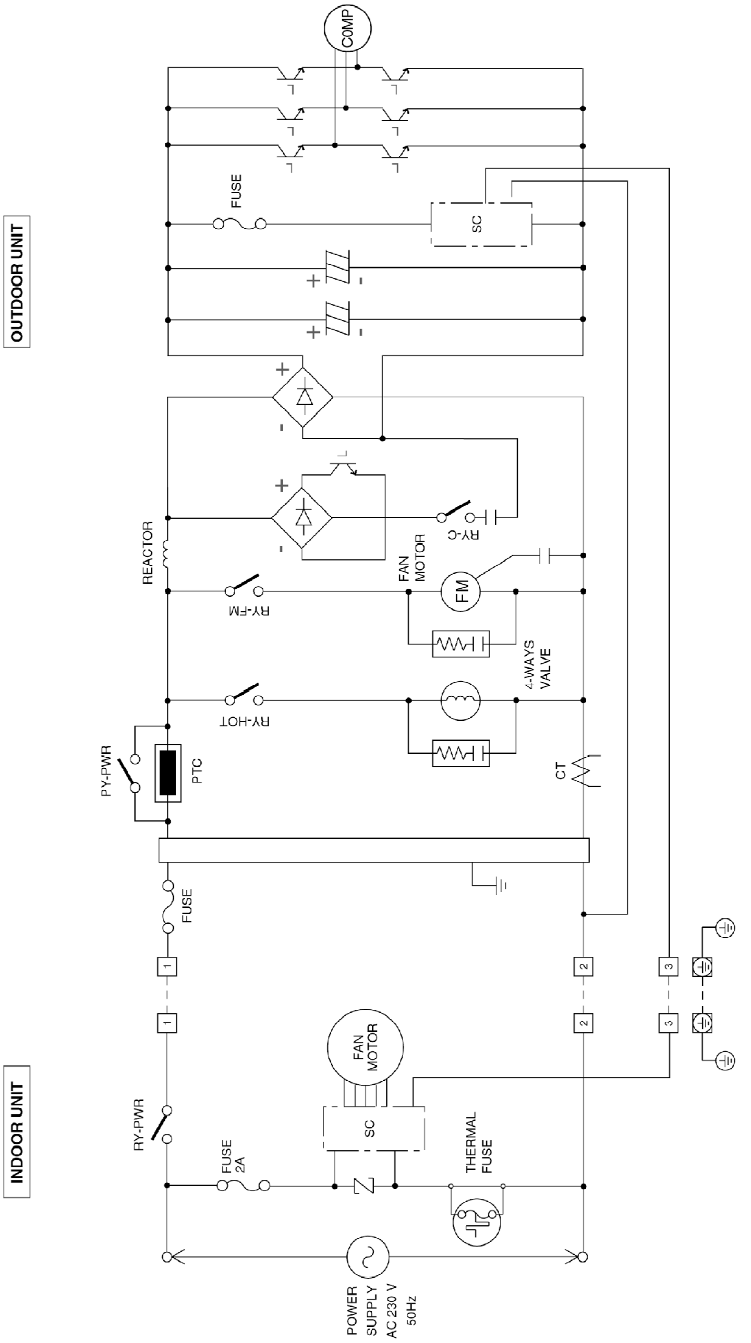
CS-E9BKP / CU-E9BKP5
CU-E12BKP / CU-E12BKP5


INDOOR
OUTDOOR
LIQUID SIDE
2-WAY VALVE
DRYER
CHECK VALVE
C1
C2
C3
INTAKE TEMP. SENSOR
PIPE TEMP. SENSOR
PIPE TEMP. SENSOR (T.R.S)
HEAT EXCHANGER (EVAPORATOR)
HEAT EXCHANGER (CONDENSER)
GAS SIDE
3-WAY VALVE
4-WAY VALVE
COMPRESSOR TEMP. SENSOR
COMPRESSOR
COOLING
HEATING

6. Block Diagram

7. Wiring Diagram

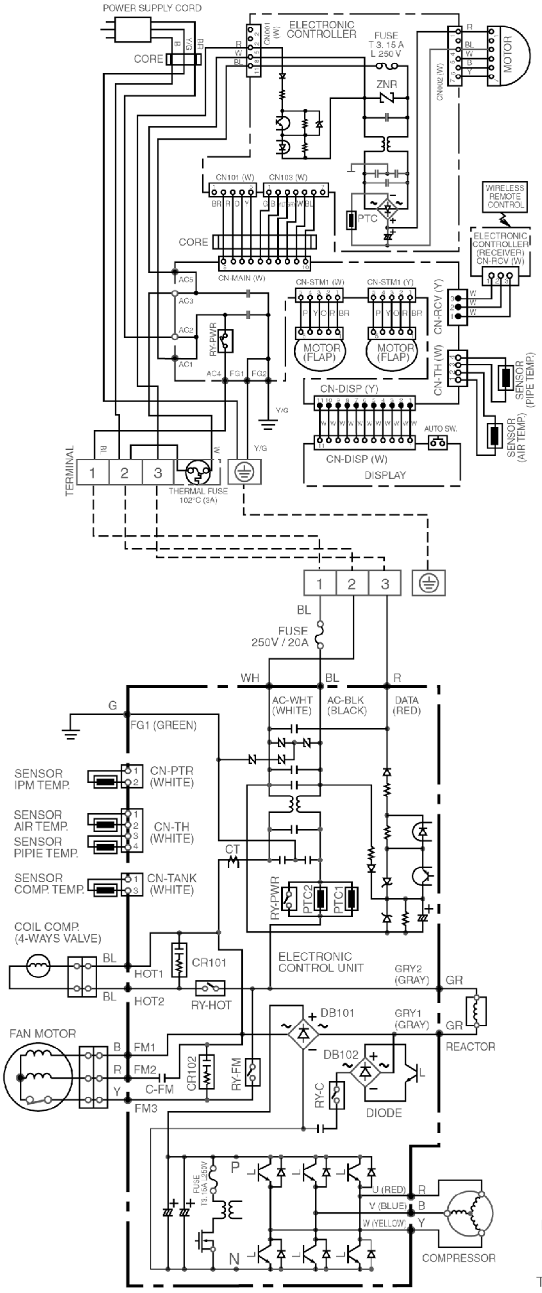
CS-E9BKP / CU-E9BKP5
CS-E12BKP / CU-E12BKP5

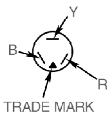

OUTDOOR UNIT
COMP
FUSE
SC
REACTOR
RY-C
FAN MOTOR
FM
RY-FM
4-WAYS VALVE
RY-HOT
PY-PWR
PTC
CT
FUSE
1
2
3
INDOOR UNIT
RY-PWR
FUSE 2A
SC
FAN MOTOR
THERMAL FUSE
POWER SUPPLY AC 230 V 50Hz

※ ┌ ┐ Indicates the electronic control unit.

※ "C" Indicates the number of core wires. (Example: 5C=5 core wires)

CS-E9BKP / CU-E9BKP5


POWER SUPPLY CORD
CORE
ELECTRONIC CONTROLLER
FUSE T 3.15 A L 250 V
ZNR
MOTOR
CN101 (W)
CN103 (W)
PTC
CORE
CN-MAIN (W)
WIRELESS REMOTE CONTROL
ELECTRONIC CONTROLLER (RECEIVER)
CN-RCV (W)
CN-RCV (Y)
CN-STM1 (W)
CN-STM1 (Y)
MOTOR (FLAP)
MOTOR (FLAP)
AC5
AC3
AC2
AC1
AC4
FG1
FG2
RY-PWR
CN-TH (W)
SENSOR (PIPE TEMP.)
SENSOR (AIR TEMP.)
CN-DISP (Y)
CN-DISP (W)
AUTO SW.
DISPLAY
Y/G
TERMINAL
1
2
3
THERMAL FUSE 102°C (3A)
BL
FUSE 250V / 20A
WH
BL
R
AC-WHT (WHITE)
AC-BLK (BLACK)
DATA (RED)
G
FG1 (GREEN)
SENSOR IPM TEMP.
CN-PTR (WHITE)
SENSOR AIR TEMP.
SENSOR PIPIE TEMP.
CN-TH (WHITE)
SENSOR COMP. TEMP.
CN-TANK (WHITE)
CT
RY-PWR
PTC2
PTC1
COIL COMP. (4-WAYS VALVE)
HOT1
HOT2
CR101
RY-HOT
ELECTRONIC CONTROL UNIT
GRY2 (GRAY)
GR
GRY1 (GRAY)
GR
REACTOR
DB101
DB102
DIODE
FAN MOTOR
B
R
Y
FM1
FM2
FM3
C-FM
CR102
RY-FM
RY-C
P
N
FUSE T3.15A 250V
U (RED)
V (BLUE)
W (YELLOW)
R
B
Y
COMPRESSOR



TRADE MARK

Remarks:

B	: BLUE
BR	: BROWN
BL	: BLACK
W	: WHITE
GR	: GREEN
R	: RED
O	: ORANGE
P	: PINK
V	: VIOLET
GRY	: GRAY
Y/G	: YELLOW / GREEN

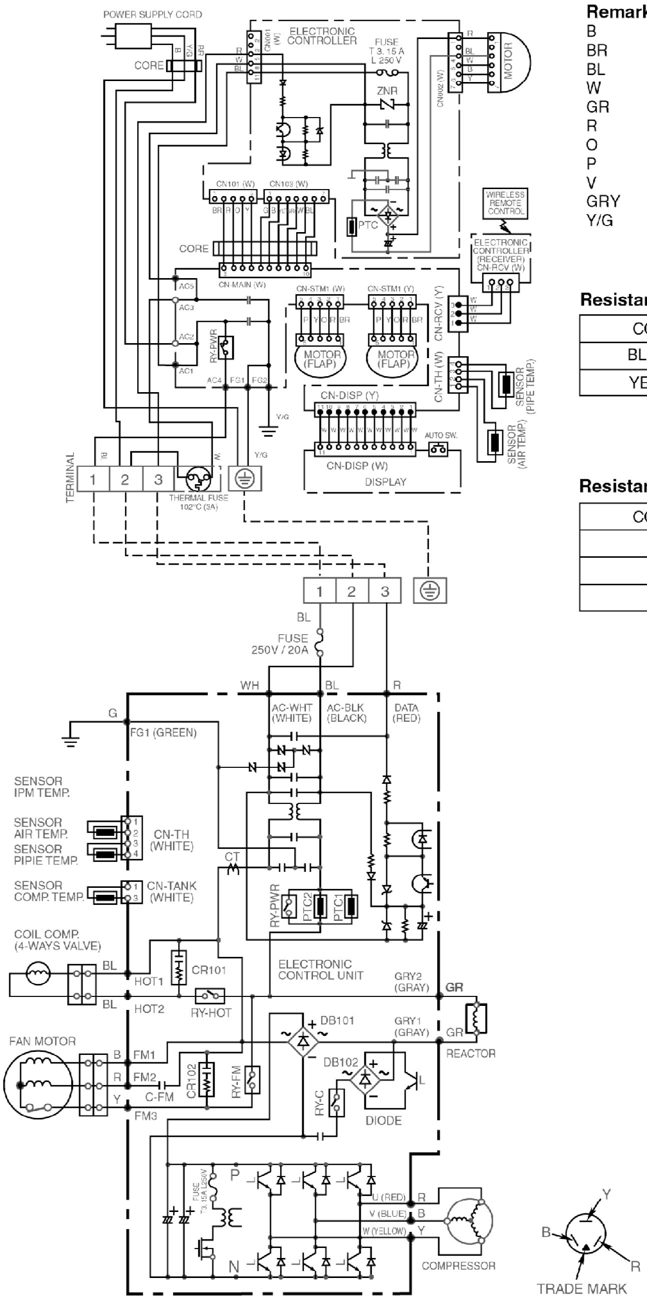
Resistance of Outdoor Fan Motor Windings

CONNECTION	CWA951125 (Ω)
BLUE - YELLOW	311.5
YELLOW - RED	304.4

Resistance of Compressor Windings

CONNECTION	5CS102XEA (Ω)
U - V	1.082
U - W	1.066
V - W	1.100

CS-E12BKP / CU-E12BKP5


POWER SUPPLY CORD
CORE
ELECTRONIC CONTROLLER
FUSE T 3.15 A L 250 V
ZNR
MOTOR
PTC
CN101 (W)
CN103 (W)
CN-MAIN (W)
CN-STM1 (W)
CN-STM1 (Y)
MOTOR (FLAP)
MOTOR (FLAP)
RY-PWR
WIRELESS REMOTE CONTROL
ELECTRONIC CONTROLLER (RECEIVER) CN-RCV (W)
CN-RCV (Y)
CN-TH (W)
SENSOR (PIPE TEMP.)
SENSOR (AIR TEMP.)
CN-DISP (Y)
CN-DISP (W)
DISPLAY
AUTO SW.
TERMINAL
THERMAL FUSE 102°C (3A)
FUSE 250V / 20A
WH
BL
R
G
FG1 (GREEN)
AC-WHT (WHITE)
AC-BLK (BLACK)
DATA (RED)
SENSOR IPM TEMP.
SENSOR AIR TEMP.
SENSOR PIPIE TEMP.
CN-TH (WHITE)
SENSOR COMP. TEMP.
CN-TANK (WHITE)
CT
RY-PWR
PTC2
PTC1
COIL COMP. (4-WAYS VALVE)
HOT1
HOT2
CR101
RY-HOT
ELECTRONIC CONTROL UNIT
GRY2 (GRAY)
GR
DB101
GRY1 (GRAY)
REACTOR
FAN MOTOR
FM1
FM2
C-FM
FM3
CR102
RY-FM
DB102
RY-C
DIODE
FUSE T3.15A L250V
P
N
U (RED)
V (BLUE)
W (YELLOW)
COMPRESSOR
TRADE MARK

Remarks:

B : BLUE
BR : BROWN
BL : BLACK
W : WHITE
GR : GREEN
R : RED
O : ORANGE
P : PINK
V : VIOLET
GRY : GRAY
Y/G : YELLOW / GREEN

Resistance of Outdoor Fan Motor Windings

CONNECTION	CWA951126 (Ω)
BLUE - YELLOW	228.5
YELLOW - RED	245.4

Resistance of Compressor Windings

CONNECTION	5CS102XEA (Ω)
U - V	1.082
V - W	1.066
U - W	1.100

8. Operation Details

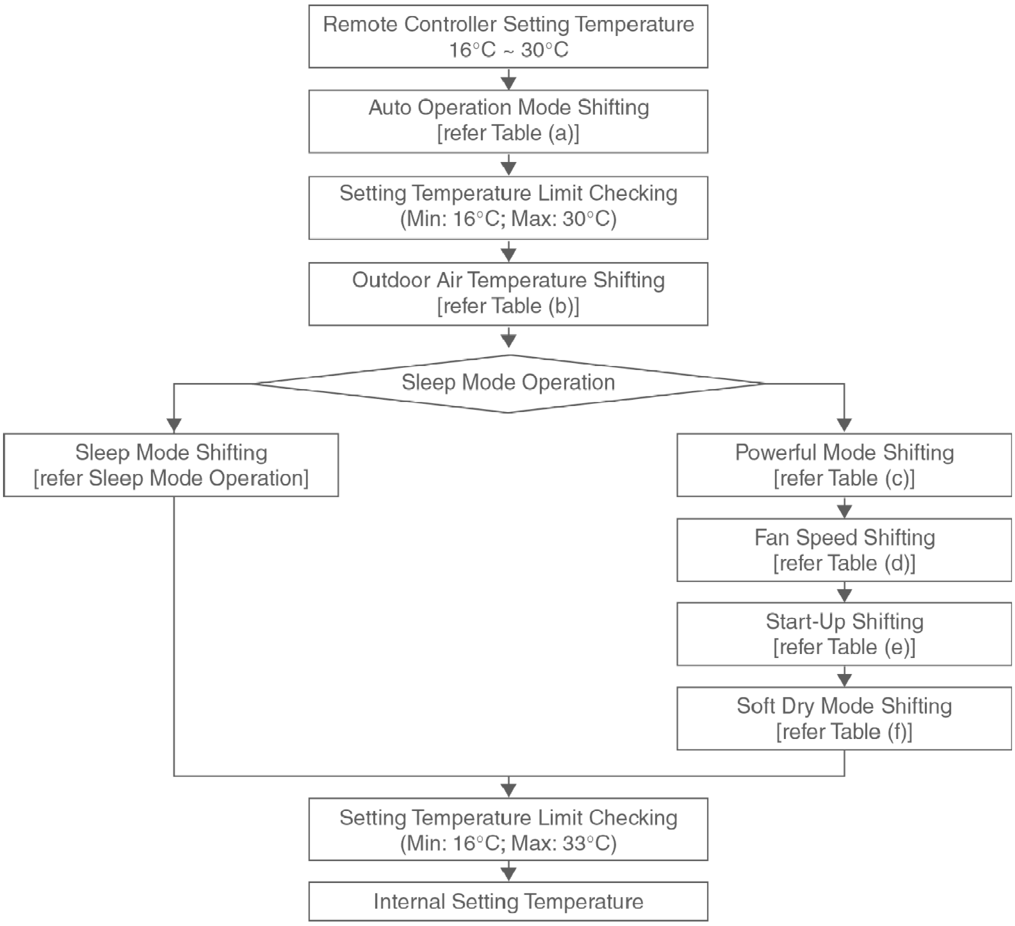
8.1. BASIC FUNCTION

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjust output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the

environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal setting temperature and intake air temperature.

8.1.1. Internal Setting Temperature

Once the operation starts, remote controller setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



Remote Controller Setting Temperature 16°C ~ 30°C
Auto Operation Mode Shifting [refer Table (a)]
Setting Temperature Limit Checking (Min: 16°C; Max: 30°C)
Outdoor Air Temperature Shifting [refer Table (b)]
Sleep Mode Operation
Sleep Mode Shifting [refer Sleep Mode Operation]
Powerful Mode Shifting [refer Table (c)]
Fan Speed Shifting [refer Table (d)]
Start-Up Shifting [refer Table (e)]
Soft Dry Mode Shifting [refer Table (f)]
Setting Temperature Limit Checking (Min: 16°C; Max: 33°C)
Internal Setting Temperature

Table (a): Auto Operation Mode Setting

Mode Shift:	Temperature Shift (K)	
	E9BKP	E12BKP
Cooling/Soft Dry → Heating	-2.0	-2.0
Heating → Cooling/Soft Dry	+2.0	+2.0

Table (b): Outdoor Air Temperature Shifting

Mode:	Outdoor Temperature, X (°C):	Temperature Shift (K)	
		E9BKP	E12BKP
Cooling/Soft Dry	X≧30	0.0	0.0
	X < 30	+0.5	+0.5
Heating	X≧9	0.0	0.0
	5≦X < 9	+0.5	+1.0
	1≦X < 5	+1.0	+1.5
	X < 1	+1.5	+2.0

Table (c): Powerful Mode Shifting

Mode:	Period, X (min):	Temperature Shift (K)	
		E9BKP	E12BKP
Cooling	X < 20	-2.0	-2.0
	X≧20	0.0	0.0
Soft Dry	X < 20	-1.0	-1.0
	X≧20	0.0	0.0
Heating	X < 20	+3.5	+3.5
	X≧20	+3.5	+3.5

Table (d): Fan Speed Shifting

Mode:	Fan Speed:	Temperature Shift (K)	
		E9BKP	E12BKP
Cooling	All	+1.5	+1.5
Soft Dry	All	+1.0	+1.0
Heating	Lo	+1.0	+1.0
	Me-, Me, Me+, Hi, Auto	+0.5	+0.5

Table (e): Start-Up Shifting

Mode within 60 Minutes from Start-up:	Temperature Shift (K)	
	E9BKP	E12BKP
Cooling/Soft Dry	-1.0	-1.0
Heating	+2.0	+2.0

Table (f): Soft Dry Mode Shifting

Mode:	Temperature Shift (K)	
	E9BKP	E12BKP
Soft Dry	+1.0	+1.0

8.1.2. Frequency Instruction for Compressor Operation

Operation of compressor is based on instructed frequency, continuously from indoor unit's microcomputer after performing temperature sampling and judgment.

There are total 30 different frequency values, which listed as Table on Frequency Number, to be instructed based on the temperature judgment

Table on Frequency Number

No.	Frequency (Hz)		Remarks
	E9BKP	E12BKP	
1	12.0	12.0	Freq. MIN
2	15.0	15.0	
3	18.0	18.0	
4	21.0	21.0	
5	23.0	23.0	
6	25.0	25.0	
7	26.0	28.0	
8	30.0	32.0	
9	33.0	36.0	
10	35.0	40.0	
11	36.0	44.0	
12	38.0	48.0	
13	39.0	52.0	
14	40.0	57.0	
15	47.0	62.0	
16	49.0	67.0	
17	56.0	68.5	
18	58.0	72.0	
19	63.0	76.0	
20	66.0	80.0	
21	70.0	85.0	
22	73.0	88.0	
23	77.0	91.0	
24	80.0	94.0	
25	83.0	98.0	
26	86.0	102.0	
27	87.0	104.0	

28	**88.0**	**106.0**	
29	**89.0**	**108.0**	
30	**90.0**	**110.0**	**Freq. MAX**

For normal start of operation, including Thermo-OFF, Deice-Resuming, and remote controller ON -OFF starts, the compressor starts to operate at frequency no. 8, values of 30Hz and 32Hz for E9BKP and E12BKP respectively, for 60 seconds.

The frequency to be judged and instructed, however, starts to judge once the air conditioner operated and the judgment will continue every 30 seconds until it is stopped by all kinds of compressor off conditions. This judgment is based on the internal temperature sampling that involving internal setting temperature and intake air temperature.

From the internal sampling, the temperature different (intake air temperature - internal setting temperature) will be used to judge the Zone on which the frequency to be instructed for the initial operation of compressor (refer to Table on Initial Frequency Zone).

Table on Initial Frequency Zone

Temperature, X (K) (Intake Air - Internal Setting)	Zone	Freq. No. - E9BKP			Freq. No. - E12B	
		Cooling	Soft Dry	Heating	Cooling	Soft Dry
X≤-2.5	0	1	4	30	1	4
-2.5 < X≤-1.5	1	1	4	30	1	4
-1.5 < X≤-1.0	2	1	4	10	1	4
-1.0 < X≤-0.5	3	1	4	7	1	4
-0.5 < X≤+1.0	4	4	4	4	4	4
+0.5 < X≤+1.0	5	6	6	1	6	6
+1.0 < X≤+1.5	6	9	7	1	9	8
+1.5 < X≤+2.5	7	15	7	1	15	8
X > +2.5	8	15	7	1	15	8

After the initial operation, the instructed frequency will change or shift from initial frequency according to the judgment on temperature different from sampling (refer to the Table on Shifting Frequency Zone).

Table on Shifting Frequency Zone

Temperature, X (K) (Intake Air - Internal Setting)	Zone	Frequency No. Shifting (shifting direction):	
		Cooling Mode / Soft Dry Mode	Heating Mode
X≤-2.5	0	Shift to Freq. MIN (↑)	Shift to Freq. MAX (
-2.5 < X≤-1.5	1	Shift to Freq. MIN (↑)	Shift to Freq. MAX (
-1.5 < X≤-1.0	2	-2 Freq. No. (↑)	+2 Freq. No. (↓)
-1.0 < X≤-0.5	3	-1 Freq. No. (↑)	+1 Freq. No. (↓)
-0.5 < X≤+1.0	4	Same Freq. No.	Same Freq. No.
+0.5 < X≤+1.0	5	+1 Freq. No. (↓)	-1 Freq. No. (↑)
+1.0 < X≤+1.5	6	+2 Freq. No. (↓)	-2 Freq. No. (↑)
+1.5 < X≤+2.5	7	Shift to Freq. MAX (↓)	Shift to Freq. MIN (↑
X > +2.5	8	Shift to Freq. MAX (↓)	Shift to Freq. MIN (↑

Besides, the range of operation frequency will change according to the setting environment as listed below:

Condition:	Freq. no. for E9BKP		Freq. no. for E12BKP		Re
	MIN	MAX	MIN	MAX	
Cooling Mode	1	15	1	30	
- if remote controller set≤28°C & fan speed = Hi	7	15	7	30	(a
- if remote controller set≤28°C & fan speed = Me-, Me, Me+, Auto	5	15	6	30	(a
- if remote controller set≤28°C & fan speed = Lo	4	15	5	30	(a
- if Powerful Mode ON	7	15	7	30	(a
Soft Dry Mode	4	7	4	8	
Heating Mode	1	16	1	30	
- if remote controller set≥18°C & fan speed = Hi	10	16	10	30	(b
- if remote control set≥18°C & fan speed = Me-, Me, Me+, Auto	9	16	9	30	(b
- if remote controller set≥18°C & fan speed = Lo	8	16	8	30	(b
- if Powerful Mode ON	10	16	10	30	(b

Remark:

(a) If frequency shifts up from MAX, the following frequency performed will be depending to ou temperature, as given in below table (for 30 seconds only) and then continues as normal rul

Outdoor Temperature, X (°C)	Frequency No.
X≥30	13
X < 30	7

(b) (If frequency shifts up from Freq. No. 17, the following frequency performed is as below (fo seconds only) and then continue as normal rule.

Outdoor Temperature, X (°C)	Frequency No.
X≥10	10
X≤X < 10	13
X < 4	17

(c) When temperature different (intake - setting) < -1.0 K or Thermo-Off activated and only valid seconds; not applicable during Sleep Mode, Soft Dry Mode, and Anti-freezing control.

(d) When temperature different (intake - setting) > +1.5 K or Thermo-Off activated and only vali seconds.

The frequency judgment will perform every 30 seconds. Nevertheless, the frequency is instructed to outdoor compressor after every 90 seconds except when either one of the below conditions is met:
(a) The frequency judged changes from frequency number decreasing zones (Zone No. 0 or 1 or 2 or 3) to frequency number increasing zones (Zone No. 5 or 6 or 7 or 8) and vice verse.
(b) The frequency judged falls on frequency shifting zone number 0 or 1 (shift to Frequency MIN).
(c) The frequency judged falls on frequency shifting zone number 4 (no shifting in frequency number).
(d) The frequency judged falls on frequency shifting zone number 7 or 8 (shift to Frequency MAX).
The instructed frequency is the value referred by the frequency number, which resulted from previous instructed frequency number with the numbers of frequency numbers to be shifted, in Table on Frequency Number.

Time (s)	0	30	60	90	120	150	180	210	240	270	300	330
Zone (+/-)		+	+	+	+	+	+/-	+	-	-	+/-	+
Freq. zone based on temp. diff.	8	7	7	6	6	6	4	5	3	1	4	5
Frequency shift		Max	Max	+2	+2	+2	0	+1	-1	Min	0	+1
Freq. no. judged based on previous	15	30	30	17	17	17	15	16	14	5	4	6
Freq. instruction (Y/N) & its condition	Y (a)	Y (a)	Y (b)	N	N	Y (c)	Y (d)	N	Y (e)	Y (f)	Y (d)	N
Freq. control condition	(g)	(g)	(h)			(h)				(i)		
Instructed freq.	8	8	15			15	15		14	5	5	5
Operation freq.	8	8	15	15	15	15	15	15	14	5	5	5

Note:
(a) Starting frequency.
(b) Frequency judged falls on Zone 7 or 8 (shift to Frequency MAX).
(c) 90 seconds frequency instruction limit.
(d) Frequency judged falls on Zone 4 (no shifting).
(e) Frequency no. changes from no. increasing zones to no. decreasing zones.
(f) Frequency judged falls on Zone 0 or 1 (shift to Frequency MIN).
(g) Normal initial operation starts (60 s).
(h) Maximum frequency for normal cooling operation
(i) Minimum frequency for normal cooling operation.

8.1.3. Indoor Fan Motor Operation

There are 31 fan speed numbers assigned for different fan speed operation at designed conditions, as shown in below table. The fan speed can be set manually using remote control (5

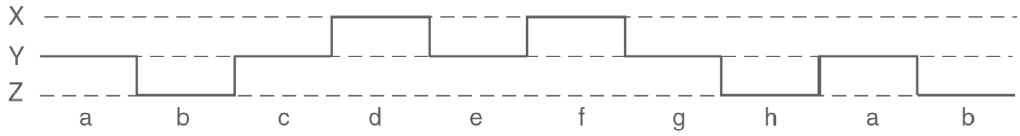
speeds for cooling mode: Lo, Me-, Me, Me+, Hi; 5 speeds for heating: Lo, Me-, Me, Me+, Shi) or let it automatically changes depending on the operation and its environment.

Fan Speed No.	CS-E9BKP				CS-E12BKP				Remark
	Voltage (V)	Cooling	Dry	Heating	Voltage (v)	Cooling	Dry	Heating	
0		OFF	OFF	OFF		OFF	OFF	OFF	- Hot start control. - Deice control.
1									
2	3.03				3.03				
3	3.05		SLo		3.05		SLo		- Soft Dry operation mode. - ON timer pre-operation (D) - Sleep shift operation (D).
4	3.13				3.13				- Auto operation mode judg D). - ON timer preparation samp D).
5	3.15				3.23				- Auto operation mode judg - ON timer preparation samp - Sleep shift operation at co off.
6	3.16	Lo			3.29	Lo			- Sleep shift operation (C). - ON timer pre-operation at (C).
7	3.23			Lo	3.34				- ON timer pre-operation at for E9BKP (H).
8	3.24				3.40				
9	3.31	Me-			3.44	Me-			
10	3.36				3.53				
11	3.39			Me-	3.60	Me			- Powerful Mode at Lo fan fo E123BKP (C).
12	3.44				3.63				
13	3.47	Me			3.66			Lo	- Powerful Mode at Lo fan fo (C). - ON timer pre-operation at for E12BKP (H).
14	3.55			Me	3.68				- Powerful Mode at Lo fan fo (H).
15	3.57				3.71				
16	3.60				3.75			Me-	
17	3.63	Me+			3.77	Me+			- Powerful Mode at Me- fan (
18	3.66				3.83				
19	3.68				3.85				
20	3.71				3.86			Me	- Powerful Mode at Lo fan fo E12BKP (H).

21	3.73			Me+	3.91				- Powerful Mode at Me- fan E9BKP (H).
22	3.77				3.94				
23	3.79				3.98			Me+	- Powerful Mode at Me- fan E12BKP (H).
24	3.80				4.00				
25	3.82	Hi			4.00	Hi			- Powerful mode at Me, Me+ (C).
26	3.85				4.01				
27	3.89				4.05				
28	3.90				4.08				
29	3.91				4.11				
30	3.93			SHi	4.16			SHi	- Powerful mode at Me, Me+ (H).
31	4.07				4.30				

8.1.4. Cooling Mode Automatic Indoor Fan Speed

The automatic fan speed for cooling operation is as shown in below patterns (a → b → c → → h) with each pattern 10 seconds. The fan speed for each level (X or Y or Z) is as below table.



Model No.	E9BKP			E12BKP		
Level	X	Y	Z	X	Y	Z
Normal Operation Fan Speed No.	11	9	7	10	9	7
Powerful Mode Fan Speed No.	13	11	9	12	10	9

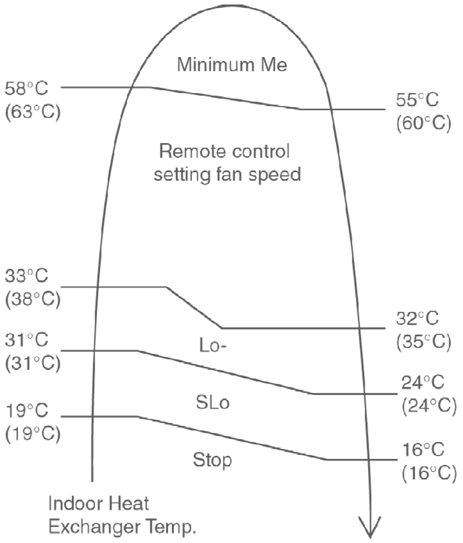
(a) During cooling operation, if all the following conditions occur, indoor fan speed will be shifted to Shi internally.

(i) Indoor intake air temperature≦24°C.
(ii) Instructed frequency = 39 Hz (E9BKP) or 52 Hz (E12BKP).
(iii) Remote controller setting temperature = 16°C.
(iv) Remote controller setting fan speed = Hi.
(v) Outdoor air temperature≧30°C.
(vi) Operation starts≦30 minutes.

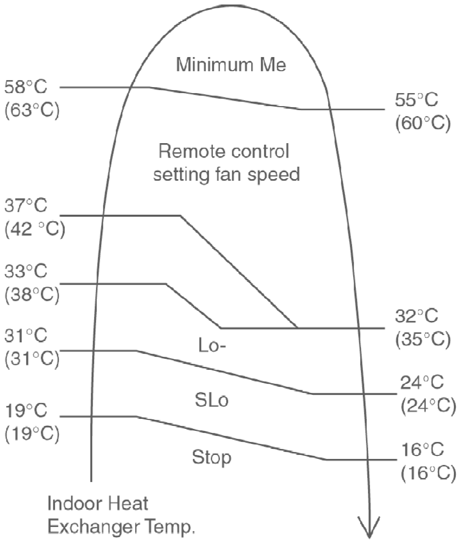
8.1.5. Heating Mode Indoor Fan Motor Operation (Anti Cold draft Control)

Indoor fan speed varies in accordance to indoor heat exchanger temperature, based on type of air volume and direction, as shown below.

1. Manual Fan Speed

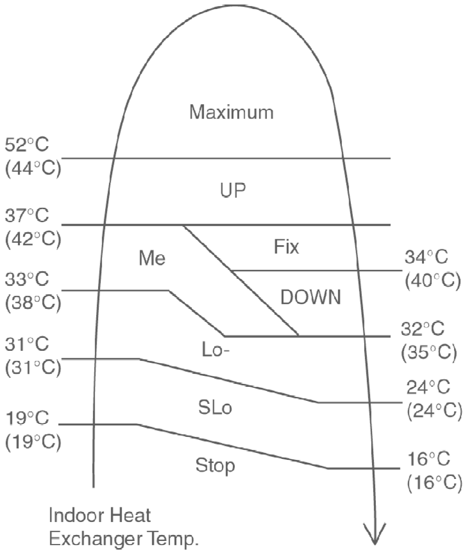

Minimum Me
58°C
(63°C)
55°C
(60°C)
Remote control
setting fan speed
33°C
(38°C)
32°C
(35°C)
31°C
(31°C)
Lo-
24°C
(24°C)
19°C
(19°C)
SLo
Stop
16°C
(16°C)
Indoor Heat
Exchanger Temp.

Auto Airflow Direction

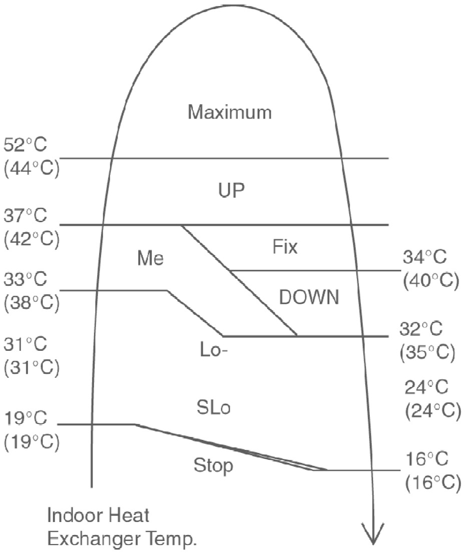

Minimum Me
58°C
(63°C)
55°C
(60°C)
Remote control
setting fan speed
37°C
(42 °C)
33°C
(38°C)
32°C
(35°C)
31°C
(31°C)
Lo-
24°C
(24°C)
19°C
(19°C)
SLo
Stop
16°C
(16°C)
Indoor Heat
Exchanger Temp.

Manual Airflow Direction

2. Auto Fan Speed


Maximum
52°C
(44°C)
UP
37°C
(42°C)
Me
Fix
34°C
(40°C)
33°C
(38°C)
DOWN
32°C
(35°C)
31°C
(31°C)
Lo-
24°C
(24°C)
SLo
19°C
(19°C)
Stop
16°C
(16°C)
Indoor Heat
Exchanger Temp.

Auto Airflow Direction


Maximum
52°C
(44°C)
UP
37°C
(42°C)
Me
Fix
34°C
(40°C)
33°C
(38°C)
DOWN
32°C
(35°C)
31°C
(31°C)
Lo-
24°C
(24°C)
SLo
19°C
(19°C)
Stop
16°C
(16°C)
Indoor Heat
Exchanger Temp.

Manual Airflow Direction

Note:

A. UP:

- **If move from Lo-, the fan speed will be shifted to Maximum.**
- **If move from Maximum, the fan speed no change.**
- **Other than that, the fan speed will be increased one Fan Speed No.**

B. DOWN:

- **The fan speed will be decreased one Fan Speed No.**

C. **Fix:**

- **No change in fan speed.**

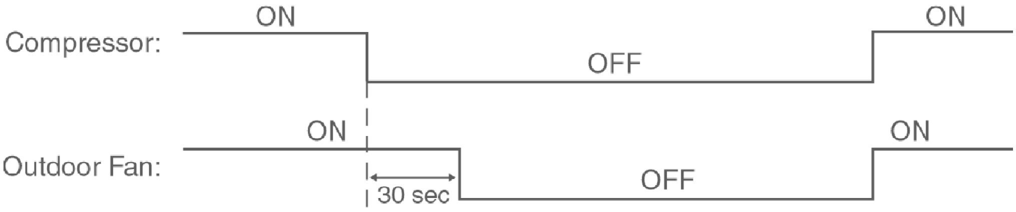
D. **Maximum:**

- **Fan speed will be increased to maximum auto fan speed.**

E. **Temperature in ( ) is for Powerful Mode operation.**

8.1.6. Outdoor Fan Motor Operation

Outdoor fan motor is operated with one fan speed only. It starts when compressor starts operation and it stops 30 seconds after compressor stops operation.



8.1.7. Airflow Direction

1. **There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).**
2. **Control of airflow direction can be automatic (angles of direction is determined by operation mode, heat exchanger temperature and intake air temperature) and manual (angles of direction can be adjusted using remote controller).**

Vertical Airflow

Operation Mode	Airflow Direction		Vane Angle (°)				
			1	2	3	4	5
Heating	Auto, with Heat Exchanger Temperature	A	17				
		B	58				
		C	7				
	Manual		7	17	33	49	67
Cooling, Soft Dry and Fan	Auto		7 ~ 37				
	Manual		7	17	25	33	41
Mode Judgment in Auto	Auto		7				
	Manual		7	17	25	33	41

1. **Automatic vertical airflow direction can be set using remote controller; the vane swings up and down within the angles as stated above. For heating mode operation, the angle of the vane**

depends on the indoor heat exchanger temperature as Figure 1 below. When the air conditioner is stopped using remote controller, the vane will shift to close position.

2. **Manual vertical airflow direction can be set using remote controller; the angles of the vane are as stated above and the positions of the vane are as Figure 2 below. When the air conditioner is stopped using remote controller, the vane will shift to close position.**

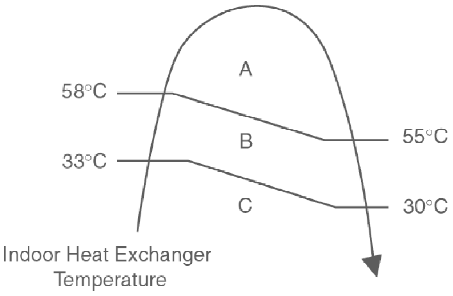


Figure 1

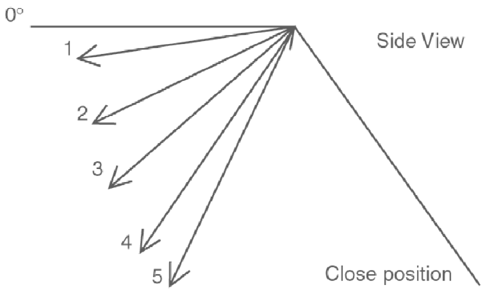


Figure 2

Horizontal Airflow

1. **Automatic horizontal airflow direction can be set using remote controller; the vane swings left and right within the angles as stated below. For heating mode operation, the angle of the vane depends on the indoor heat exchanger temperature as Figure 1 below.**

Operation Mode		Vane Angle (°)
Heating, with heat exchanger temperature	**A**	**55 ~ 125**
	B	**90**
Cooling, Soft Dry and Fan		**55 ~ 125**

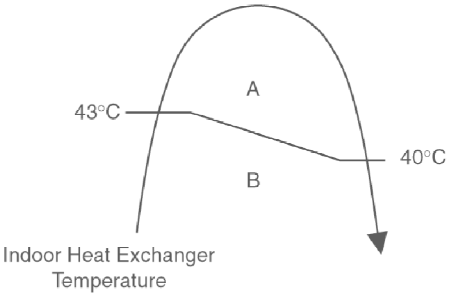


Figure 1

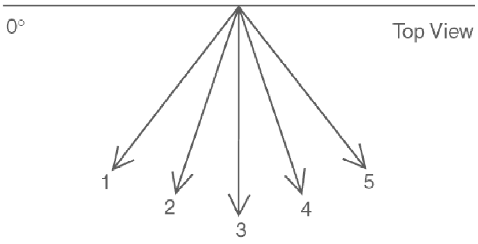
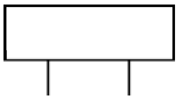
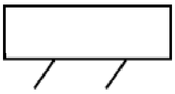
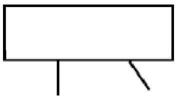


Figure 2

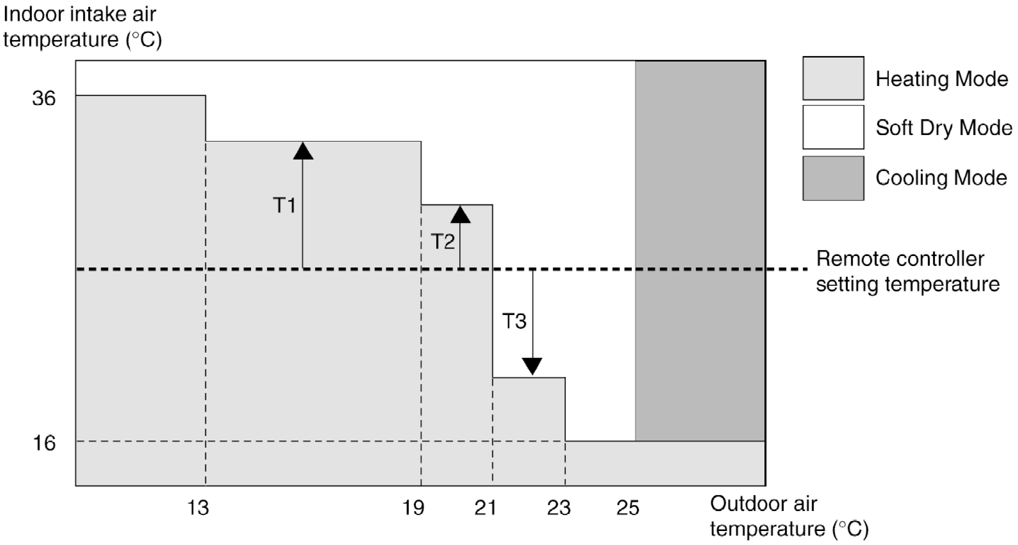
2. Manual horizontal airflow direction can be set using remote controller; the angles of the vane are as stated below and the positions of the vane are as Figure 2 above.

Pattern	**1**	**2**	**3**	**4**	**5**
Airflow Direction Patterns at Remote Controller					
Vane Angle (°)	**90**	**55**	**70**	**110**	**125**

8.1.8. Automatic Mode Operation

This mode can be set using remote controller and the operation is decided by remote controller setting temperature, indoor intake air temperature and outdoor air temperature.

During operation mode judgment, indoor fan motor (with speed of Lo-) and outdoor fan motor are running for 20 seconds to detect the indoor intake and outdoor air temperature. The operation mode is decided based on below chart.



Values of T1, T2, and T3 depend on remote controller setting temperature, as shown in below

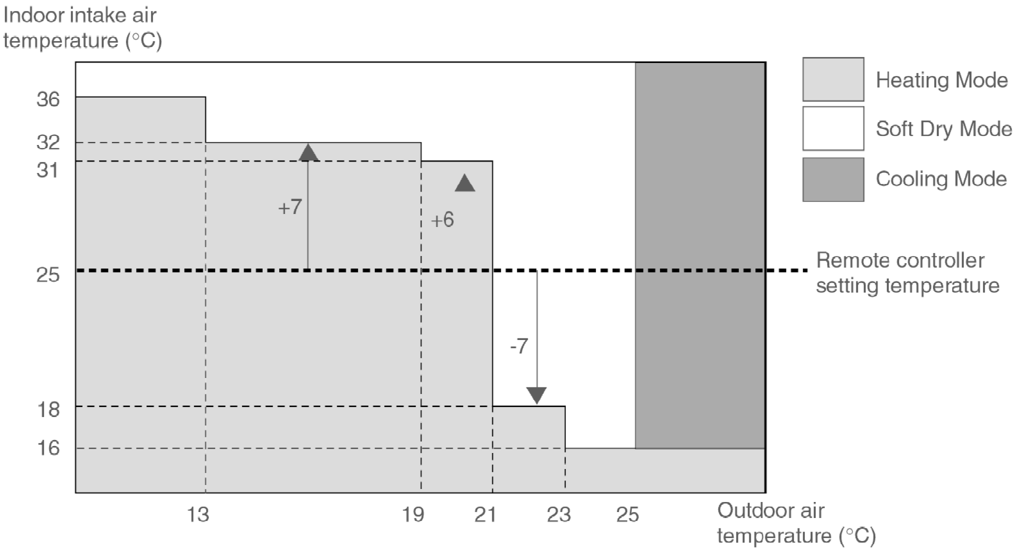
table. After the adjustment of T1, T2 and T3 values, the operation mode for that particular environment and remote controller setting is judged and performed, based on the above operation mode chart, every 30 minutes. Heating mode operation will be performed, however, if deice operation is detected.

Remote Controller Setting Temperature (°C)	**T1**	**T2**	**T3**
16 ~ 18	**+10**	**+8**	**-5**
19 ~ 22	**+8**	**+7**	**-7**
23 ~ 26	**+7**	**+6**	**-7**
27 ~ 30	**+6**	**+5**	**-8**

There is a temperature shifting on T1, T2, and T3 if the operation mode judged is changed from Cooling/Soft Dry to Heating or vice verse.

Operation Mode change from	**Temperature shifts (K)**
Cooling/Soft Dry → Heating	**-2**
Heating → Cooling/Soft Dry	**+2**

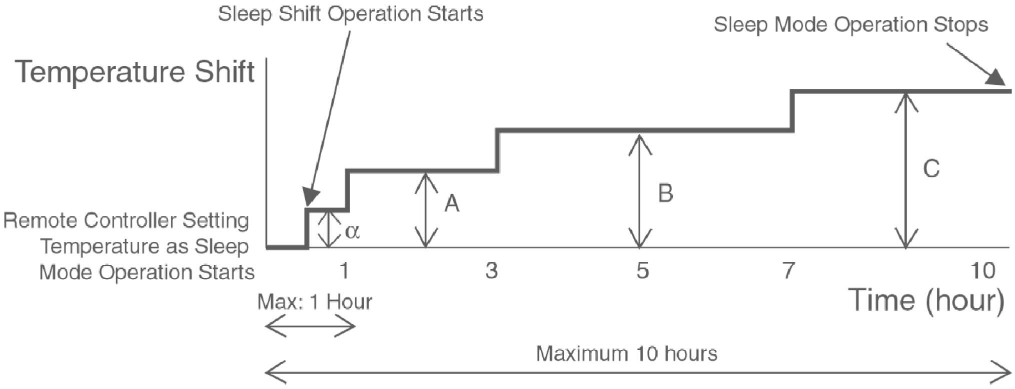
The operation mode chart for this example is as shown in below figure and the operation mode to be performed will depend on indoor intake air temperature and outdoor air temperature at the time when the judgment is made.



8.1.9. Sleep Mode Operation

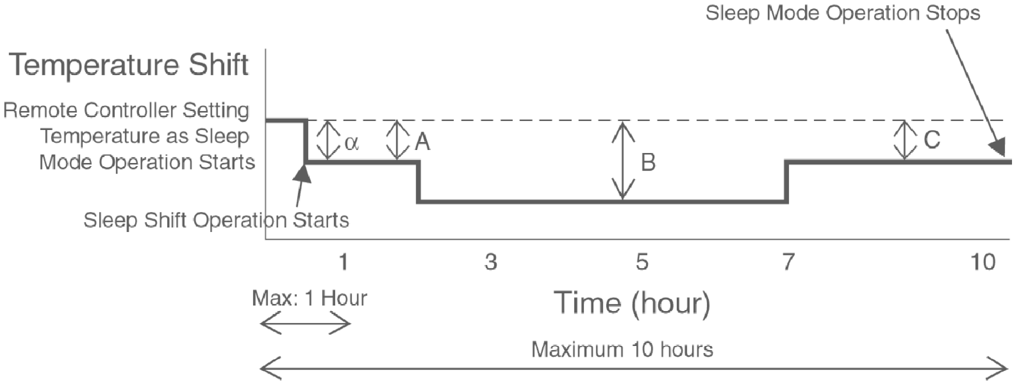
1. **Sleep Mode operation starts by pressing the button at remote controller and the operation last for a maximum of 10 hours. The Sleep Shift operation starts when the intake air temperature = internal setting temperature or one hour after Sleep Mode operation starts**
2. **For Cooling Mode or Soft Dry Mode operations, during Sleep Shift operation, indoor fan motor will operate at Lo speed and SLo**

speed respectively. The internal setting temperature is shifted as stated in below figure and table.



Condition		Shifting Temperature (°C)						
Remote Controller Setting Temperature (°C)	Outdoor Air Temperature (°C)	Cooling Mode				Soft Dry Mod		
		α	A	B	C	α	A	B
≤26	< 25	+2	+3.0	+4.0	+5.0	+1.5	+2.0	+3.0
	≥25	+2	+3.0	+3.5	+4.0	+1.5	+2.0	+2.5
27	< 25	+2	+3.0	+4.0	+4.0	+1.5	+2.0	+3.0
	≥25	+2	+3.0	+3.5	+4.0	+1.5	+2.0	+2.5
≥28	—	+2	+3.0	+3.0	+3.0	+1.5	+2.0	+2.0

3. For Heating Mode operation, during Sleep Shift operation, indoor fan motor will operate at Lo- speed. The internal setting temperature is shifted as stated in below figure and table.

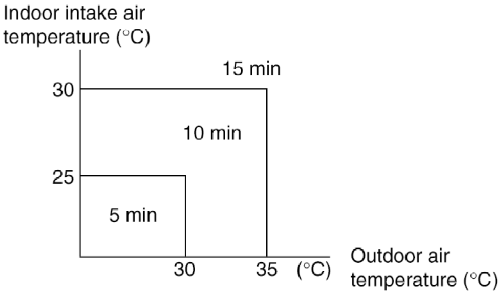


Remote Controller Setting Fan Speed	Shifting Temperature (°C)			
	α	A	B	C
Lo	-1.0	-1.0	-5.0	-4.0
Me-, Me, Me+, Hi, Auto	-0.5	-0.5	-4.5	-3.5

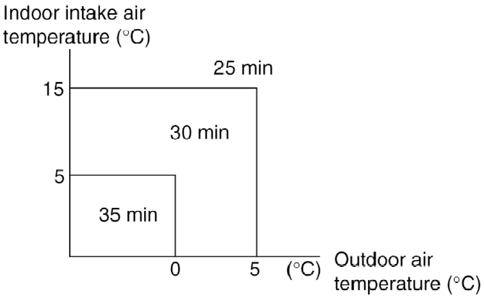
8.2. Protection Control Features

8.2.1. Delay ON Timer Control

This control is applicable to all kinds of operation mode.
Delay ON timer can be set using remote controller, the unit with timer set will start operate earlier than the setting time. This is to provide a comfortable environment when reaching the set ON time.
Seventy minutes before the set time, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 20 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation mode.
From the above judgment, the decided operation will start operate earlier than the set time as shown below.



Cooling/Soft Dry



Heating

8.2.2. OFF Timer Control

This control is applicable to all kinds of operation mode.
OFF timer can be set using remote controller, the unit with timer set will stop operate at set time.

8.2.3. Indoor Power Relay Control

Power relay will turn on during operation or in progress of stopping operation. Although operation stops, the power relay continues on for three minutes.
However, during instantaneous power failure (< 0.5s), power relay will turn off. Then, it will turn on two minutes after power recover and the unit will operate as previous operation condition.

8.2.4. Time Delay Safety Control

This control is applicable to all kinds of operation mode.

1. **The compressor will not start for three minutes after stop of operation.**
2. **This control is not applicable if the power supply is cut off and on again or after 4-way valve deices condition.**

8.2.5. 30 Seconds Forced Operation

This control is applicable to all kinds of operation mode.

1. **Once the compressor starts operation, it will not stop its operation for 30 seconds.**
2. **However, it can be stopped using remote control or Auto Switch at indoor unit.**

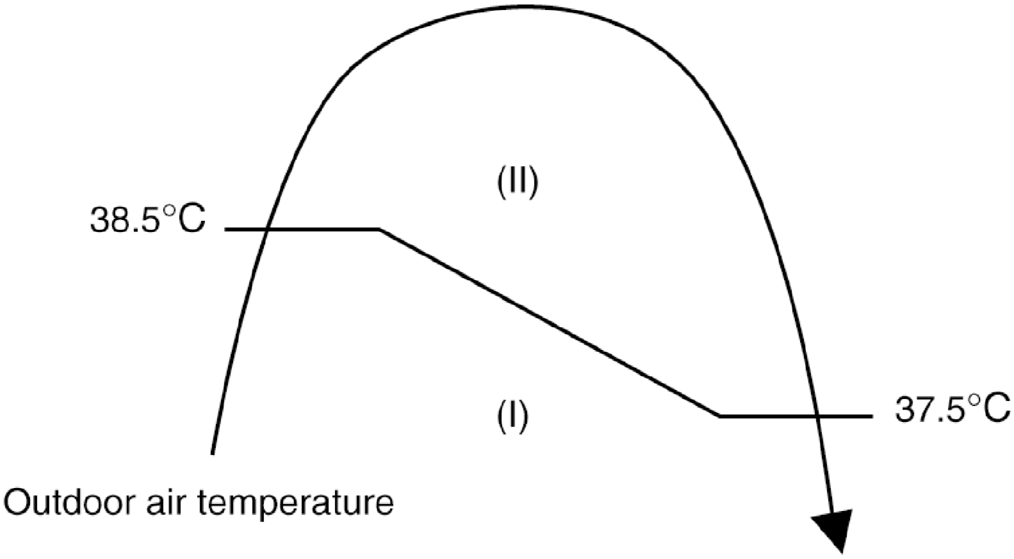
8.2.6. Total Running Current Control

This control is applicable to all kinds of operation mode.

1. **When the total outdoor unit running current (AC) exceeds X value, the frequency instructed for compressor operation will be shifted up a step to smaller frequency number.**
2. **If the running current does not exceed X value for five seconds, the frequency instructed will be shifted down a step at one time to bigger frequency number.**
3. **However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for three minutes.**

Operation Mode	E9BKP		E12BKP	
	X (A)	Y (A)	X (A)	Y (A)
Cooling/Soft Dry (I)	4.5	17.0	6.5	17.0
Cooling/Soft Dry (II)	4.0	17.0	6.0	17.0
Heating	6.1	17.0	9.2	17.0

4. **The first 30 minutes of cooling operation, (I) will be applied.**



8.2.7. IPM (Power transistor) Prevention Control

This control is applicable to all kinds of operation mode.

A. DC Peak Current Control

1. **When electric current to IPM exceeds set value of 22.5 A, the compressor will stop operate. Then, operation will restart after three minutes.**

2. **If the set value is exceeded again within 30 seconds, the operation will restart after one minute. If this condition repeats continuously for seven times, all indoor and outdoor relays will be cut off.**

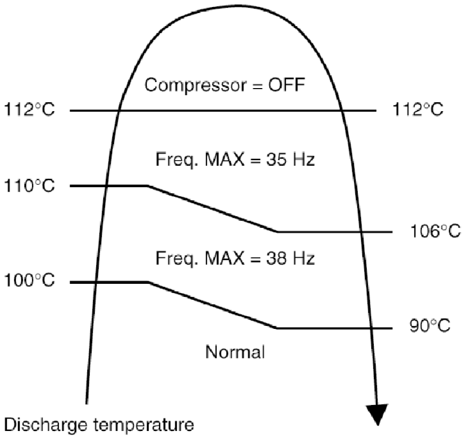
B. Overheating Prevention Control

1. **When the IPM temperature rises to 110°C, compressor operation will stop immediately.**
2. **Compressor operation restarts after three minutes the temperature decreases to 95°C.**

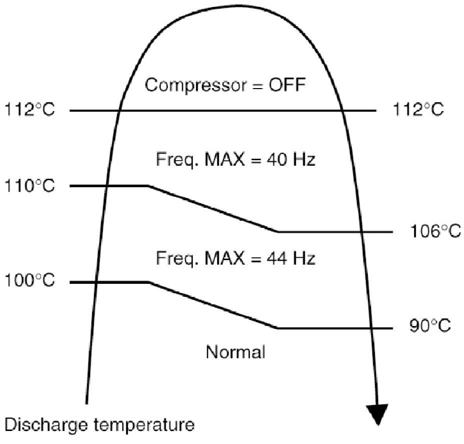
8.2.8. Compressor Overheating Prevention Control

This control is applicable to all kinds of operation mode.

Instructed frequency for compressor operation will be regulated by compressor discharge temperature. The changes of frequency are as below figure.


Compressor = OFF
112°C
112°C
Freq. MAX = 35 Hz
110°C
106°C
Freq. MAX = 38 Hz
100°C
90°C
Normal
Discharge temperature

E9BKP


Compressor = OFF
112°C
112°C
Freq. MAX = 40 Hz
110°C
106°C
Freq. MAX = 44 Hz
100°C
90°C
Normal
Discharge temperature

E12BKP

8.2.9. Low Pressure Control (Gas Leakage Detection)

This control is applicable to all kinds of operation mode.

1. **When the conditions listed in below table occur, the compressor stops and restarts after three minutes.**
2. **If this phenomenon is continuously occurring for twice within 20 minutes, all indoor and outdoor relays will be cut off.**
3. **This control is not applicable for deice operation.**

Conditions	E9BKP		E12BKP	
	Cooling/Soft Dry	Heating	Cooling/Soft Dry	Heating
1. Compressor frequency (Hz)	47	56	67	68.5
2. Outdoor total running current (A)	< 1.21	< 1.21	< 1.21	< 1.21
3. Indoor heat exchanger temperature	> 20	< 25	> 20	< 25

8.2.10. Minimum Operation Frequency Protection Control

This control is applicable to all kinds of operation mode.

When the compressor operate at frequency lower than 26 Hz (E9BKP) or 28 Hz (E12BKP) for 240 minutes, the operation frequency will be increased to 26 Hz (E9BKP) or 28 Hz (E12BKP) for two minutes.

8.2.11. Low Operation Frequency Protection Control

This control is applicable to all kinds of operation mode.

When all the below conditions occur, minimum value (Freq. MIN) for the frequency instructed to compressor will change to 30 Hz (E9BKP) and 32 Hz (E12BKP) for cooling mode operation, and 21 Hz (E9BKP & E12BKP) for heating mode operation.

Temperature, T, for:	Cooling/Soft Dry	Heating
Indoor intake air (°C)	15 < T≦30	—
Outdoor air (°C)	16 < T≦38	4 < T≦24
Indoor heat exchanger (~C)	T < 30	T≧0

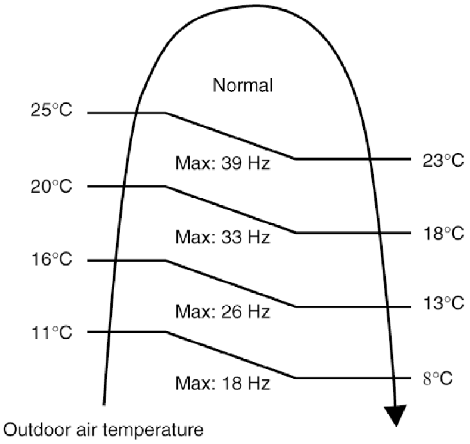
8.2.12. Auto Restart Control

This control is applicable to all kinds of operation mode.

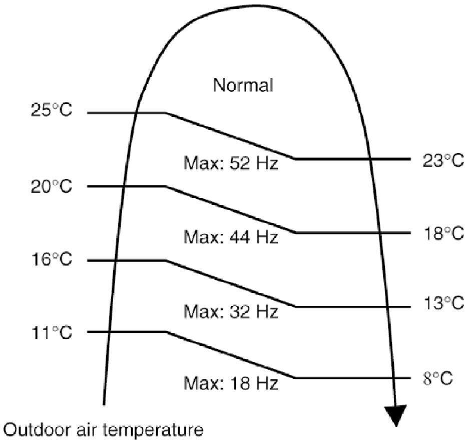
1. When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes (there are 10 patterns between 2 minutes 58 seconds and 3 minutes 52 seconds to be selected randomly) after power supply resumes.
2. This type of control is not applicable during Sleep Mode Operation and ON/OFF Timer setting.

8.2.13. Outdoor Air Temperature Control

1. For Cooling Mode and Soft Dry Mode operation, the compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below. This control will begin one minute after the compressor starts.

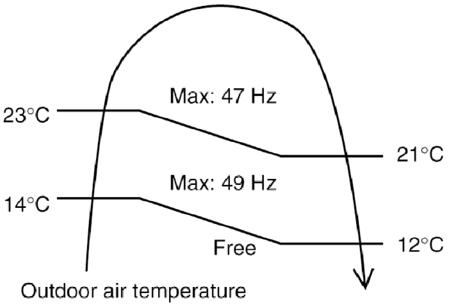


E9BKP

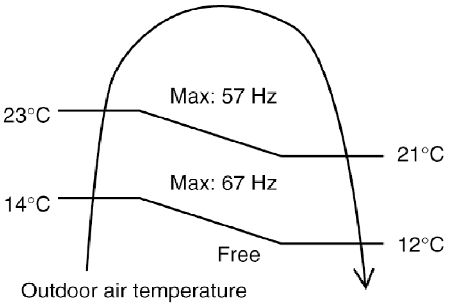


E12BKP

2. For Heating Mode operation, the compressor operating frequency is regulated in accordance to outdoor air temperature as shown in the below figures. This control will begin 50 seconds after the compressor starts.



E9BKP



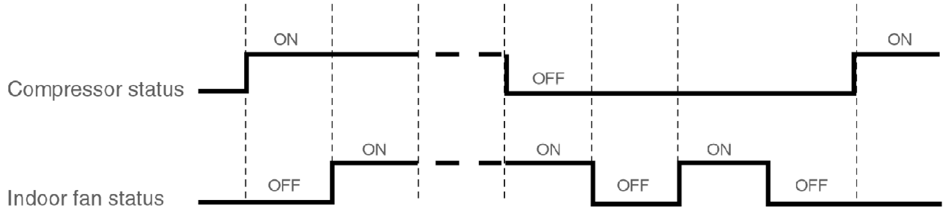
E12BKP

8.2.14. Deodorizing Control

This type of control is applicable on Cooling Mode and Soft Dry Mode operation only.

1. During cooling or soft dry operation with automatic fan speed, the unit will operate as state below for deodorizing purpose.

Step No.	1	2	3	4	5	4, 5, 4, 5…	1
Compressor status	ON			OFF			ON
Period (sec)	40	50	…	20	90	… … … …	40
Indoor fan speed	OFF	SLo	Note*	SLo	OFF	… … … …	OFF



Note*: Fan speed is automatic for cooling mode and SLo for soft dry mode.

2. When compressor is in operation, the steps follow: 1 → 2 → 3.
3. When compressor stops operation, the steps follow: 4 → 5 → 4 → 5
4. If the compressor still stops operation after three minutes, the step will start from 4.
5. This control is not applicable during sleep shift operation, ON timer preparation and anti-freezing control.

8.2.15. High Pressure at Minimum Frequency Control

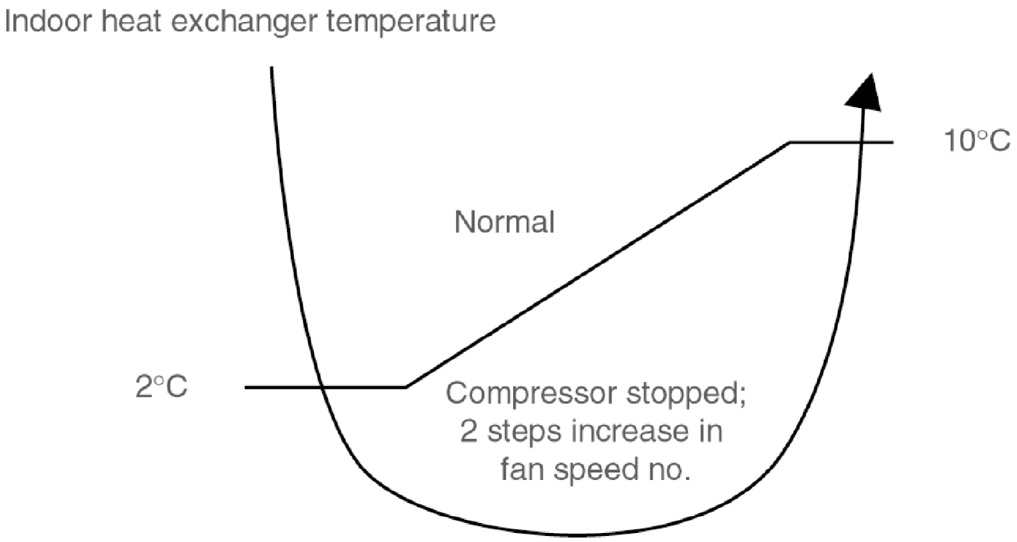
This type of control is applicable on Cooling Mode and Soft Dry Mode operation only.

1. When outdoor air temperature increases to 38.6°C, compressor operating frequency reduces to minimum of 30 Hz and 32 Hz for E9BKP and E12BKP respectively.
2. Compressor operating frequency will resume to normal when outdoor air temperature decrease to 37.8°C.

8.2.16. Anti-Freezing Control

This type of control is applicable on Cooling Mode and Soft Dry Mode operation only.

1. When indoor heat exchanger temperature is lower than 2°C continuously for six minutes, compressor will stop operating.
2. Compressor will resume its operation three minutes after the indoor heat exchanger is higher than 10°C.
3. At the same time, indoor fan speed increase its frequency as value of two steps up in Fan Speed Number compared to its normal operation. (Refer Table on Fan Speed Level and Supplied Voltage).
4. If indoor heat exchanger temperature is higher than 10°C for five minutes, the fan speed will return to its normal operation.


Indoor heat exchanger temperature
10°C
Normal
2°C
Compressor stopped; 2 steps increase in fan speed no.

8.2.17. Anti-Fog Discharge Control

This type of control is applicable on Cooling Mode and Soft Dry Mode operation only.

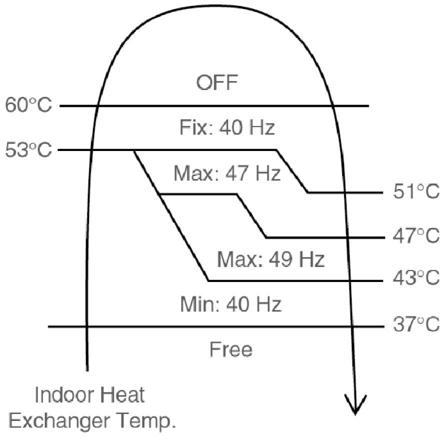
1. **When indoor fan speed is set at Me- or slower, the compressor operating frequency is regulated by operation time to prevent fog discharged from indoor as shown in below table.**

Operation time, T (min)	E9BKP	E12BKP
0 < T≦30	33 Hz	44 Hz
30 < T≦90	26 Hz	36 Hz
90 < T≦420	26 Hz	36 Hz

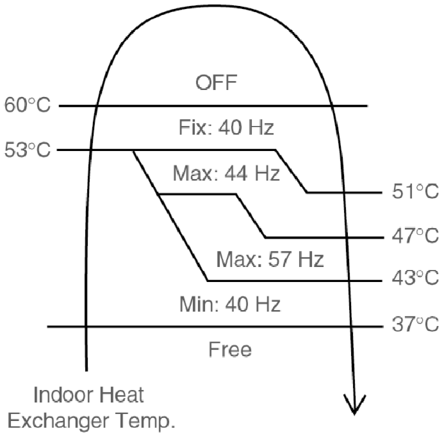
2. **After 420 minutes, the operation restarts again from the beginning.**
3. **The operation will restart the above control whenever remote controller setting temperature or fan speed setting is changed.**

8.2.18. Indoor Heat Exchanger Temperature Control

This control is applicable for Heating Mode operation only.
The compressor operating frequency is regulated in accordance to indoor heat exchanger temperature as shown in below figures.


OFF
60°C
Fix: 40 Hz
53°C
Max: 47 Hz
51°C
47°C
Max: 49 Hz
43°C
Min: 40 Hz
37°C
Free
Indoor Heat
Exchanger Temp.

E9BKP


OFF
60°C
Fix: 40 Hz
53°C
Max: 44 Hz
51°C
47°C
Max: 57 Hz
43°C
Min: 40 Hz
37°C
Free
Indoor Heat
Exchanger Temp.

E12BKP

8.2.19. Intake Air Temperature Control

This control is applicable for Heating Mode operation only.
Compressor will operate at maximum of 56 Hz or 68.5 Hz for E9BKP and E12BKP respectively if either one of the below conditions occur:

1. **When the intake air temperature is 10°C or above and remote controller setting fan speed is Me- or lower.**
2. **2. When the intake air temperature is 30°C or above.**

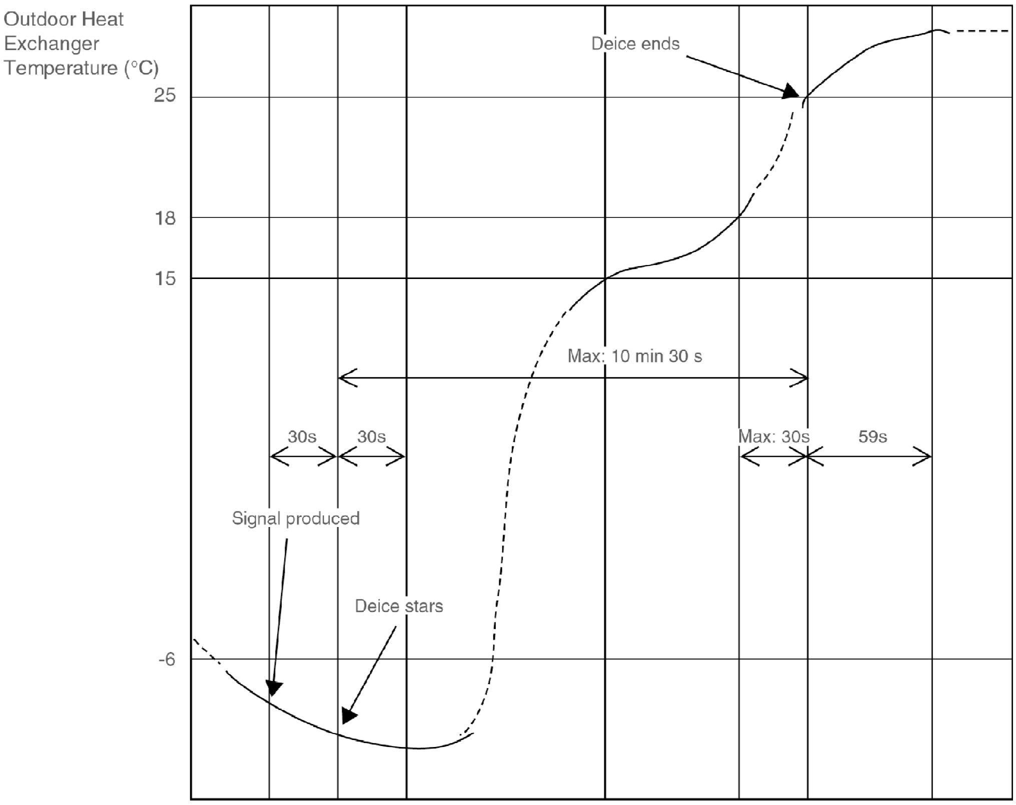
8.2.20. Deice Operation Control

This control is applicable for Heating Mode operation only.
Deice operation occurs when the deice operation starting signal is generated. This happens when one of he following condition occurs. However, the first deice operation will begin one hour after the start of heating mode operation.

Condition	Outdoor heat exchanger temp. Th < 3°C	In between, for 3 minutes, outdoor heat exchanger temp. Th	Provided, compressor is ON and outdoor air temp. To
1	For 120 minutes	< -6°C	> -1~C
2	For 80 minutes	< -7°C	> -1~C
3	For 40 minutes	< -9°C	≥-3~C
4	For 40 minutes	< -11°C	> -3~C

Once the deice operation signal produced, the instructed frequency for the operation of compressor will be set to zero hertz (0 Hz) for 30 seconds. Then, deice operation starts with both indoor and outdoor fan motor, and 4-way valve turn off for 30 seconds. The compressor operates following the frequency as shown in below chart that depending on outdoor heat exchanger temperature and operation period, with a maximum of 10 minutes and 30 seconds. When the deice operation ends, before back to normal operation, the instructed frequency for compressor will be set to zero hertz (0 Hz) again and outdoor fan motor will turn on for a period of 59 seconds.

Deice Operation Chart



Freq. (Hz)	E9BKP	Free	0	47	58	35	35	0	Fre
	E12BKP	Free	0	62	67	40	40	0	Fre
Indoor fan motor		Free	Free	OFF	OFF	OFF	OFF	OFF	Fre
Outdoor fan motor		ON	ON	OFF	OFF	OFF	OFF	ON	O
4-way valve		ON	ON	OFF	OFF	OFF	OFF	OFF	O

8.2.21. Auto Clean Deice Control

This control is applicable for Heating Mode operation only and before operation starting time set by ON Timer control to improve heating start-up operation if residual ice on outdoor heat exchanger detected.

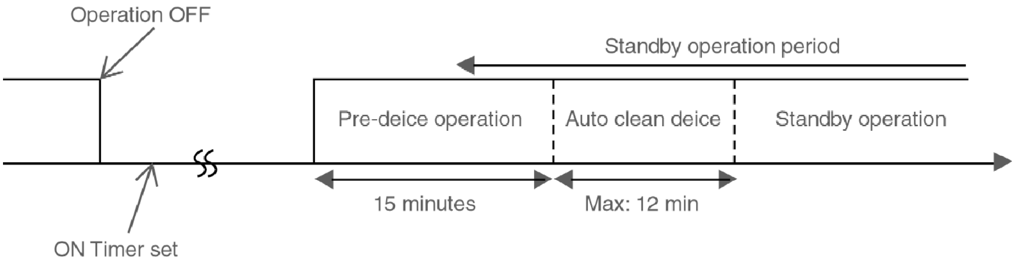
Fifteen minutes before Standby operation, pre-deice heating operation will be performed to determine the operation decision as shown in below figure. Auto Clean Deice operation starts to operate as soon as the pre-deice operation if all the below conditions occur.

(a) Outdoor air temperature≦0°C,

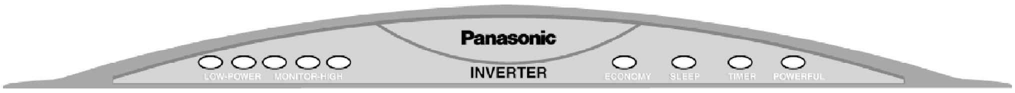
(b) Outdoor heat exchanger temperature < 0°C for 14 minutes, and

(c) Outdoor heat exchanger temperature < -8°C for 10 minutes.

The Auto Clean Deice is operated for a maximum of 12 minutes as normal Deice operation, and the period of Standby operation is maintained including the 12-minute Auto Clean Deice operation.


Operation OFF
Standby operation period
Pre-deice operation
Auto clean deice
Standby operation
15 minutes
Max: 12 min
ON Timer set

8.2.22. Indication Panel

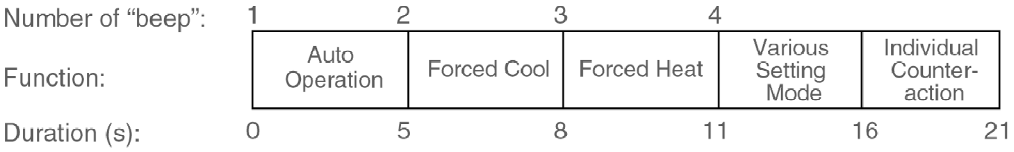

Panasonic
LOW-POWER
MONITOR-HIGH
INVERTER
ECONOMY
SLEEP
TIMER
POWERFUL

Led	POWER MONITOR	POWER	SLEEP	TIMER	POWERFUL
Color	Orange	Green	Orange	Orange	Orange
Light ON	Operation ON	Operation ON	Sleep Mode ON	Timer Setting ON	Powerful Mode ON
Light OFF	Operation OFF	Operation OFF	Sleep Mode OFF	Timer Setting OFF	Powerful Mode OFF

Note:

- **If POWER LED is blinking, the possible operations of the unit are Hot Start, during Deice operation, operation mode judgment, or delay ON timer sampling.**
- **If Timer LED is blinking, there is an abnormality operation occurs.**

8.2.23. Auto Operation Switch


Number of "beep":
1
2
3
4
Function:
Auto Operation
Forced Cool
Forced Heat
Various Setting Mode
Individual Counter-action
Duration (s):
0
5
8
11
16
21

1. **When the switch is pressed between 0 to 5 seconds, Auto Mode operation starts to function.**
2. **When the switch is pressed between 5 to 8 seconds, the unit is forced to operate in Cooling Mode.**
3. **When the switch is pressed between 8 to 11 seconds, the unit is forced to operate in Heating Mode.**
4. **When the switch is pressed between 11 to 16 seconds and together with the signal from remote control, the unit can be changed to different controlling setting (A-B mode).**
5. **When the switch is pressed between 16 to 21 seconds, either**

“H14” error detection selection mode or the remote controller's signal receiving sound can be cancelled or turned on.

9. Operating Instructions

10. Installation And Servicing Air Conditioner Using R410A

10.1. OUTLINE

10.1.1. About R410A Refrigerant

1. **Converting air conditioners to R410A / Since it was declared in1974 that chlorofluorocarbons (CFC), hydro chlorofluorocarbons (HCFC) and other substances pose a destructive danger to the ozone layer in the earth~s upper stratosphere (20 to 40 km above the earth), measures have been taken around the world to prevent this destruction. / The R22 refrigerant which has conventionally been used in ACs is an HCFC refrigerant and, therefore, possesses this ozone-destroying potential. International regulations (the Montreal Protocol Ozone-Damaging Substances) and the domestic laws of various countries call for the early substitution of R22 by a refrigerant which will not harm the ozone layer.**

    - **In ACs, the HFC refrigerant which has become the mainstream alternative called R410A.Compared with R22, the pressure of R410A is approximately 1.6 times as high at the same refrigerant temperature, but the energy efficiency is about the same. Consisting of hydrogen (H), fluorine (F) and carbon (C), R410A is an HFC refrigerant. Another typical HFC refrigerant is R407C. While the energy efficiency of R407C is some what inferior to that of R410A, it offers the advantage of having pressure characteristics which are about the same as those of R22, and is used mainly in packaged ACs.**

2. **The characteristics of HFC (R410A) refrigerants**
    A. **Chemical characteristics / The chemical characteristics of R410A are similar to those of R22 in that both are chemically stable, non-flammable refrigerants with low toxicity. / However,**

just like R22, the specific gravity of R410A gas is heavier than that of air. Because of this, it can cause an oxygen deficiency if it leaks into a closed room since it collects in the lower area of the room. It also generates toxic gas when it is directly exposed to a flame, so it must be used in a well ventilated environment where it will not collect.

Table 1 Physical comparison of R410A and R22

	R410A	R22
Composition (wt%)	R32/R125 (50/50)	R22 (100)
Boiling point (°C)	-51.4	-40.8
Vaporizing pressure (25°C)	1.56 Mpa (15.9 kgf/cm^2)	0.94 Mpa (9.6 kgf/cm^2)
Saturated vapor density	64.0 kg/m^3	44.4 kg/m^3
Flammability	Non-flammable	Non-flammable
Ozone-destroying point (ODP)	0	0.005
Global-warming point (GWP)	1730	1700

B. Compositional change (pseudo-azeotropic characteristics) / R410A is a pseudo-azeotropic mixture comprising the two components R32 and R125. Multi-component refrigerants with these chemical characteristics exhibit little compositional change even from phase changes due to vaporization 9or condensation), which means that there is little change in the circulating refrigerant composition even when the refrigerant leaks from the gaseous section of the piping. / Accordingly, R410A can be handled in almost the same manner as the single-component refrigerant R22. However, when charging, because there is a slight change in composition between the gas phase and the liquid phase inside a cylinder or other container, charging should basically begin with the liquid side.

C. Pressure characteristics / As seen in Table 2, the gas pressure of R410A is approximately 1.6 times as high as that of R22 at the same refrigerant temperature, which means that special R410A tools and materials with high-pressure specifications must be used for all refrigerant piping work and servicing.

Table 2 Comparison of R410A and R22 saturated vapor density / Unit: MPa

Refrigerant Temperature (°C)	R410A	R22
-20	0.30	0.14
0	0.70	0.40
20	1.35	0.81
40	2.32	1.43
60	3.73	2.33
65	4.15	2.60

D. R410A refrigerating machine oil / Conventionally, mineral oil or a synthetic oil such as alkylbenzene has been used for R22 refrigerating machine oil. Because of the poor compatibility between R410A and conventional oils like mineral oil, however, there is a tendency for the refrigerating machine oil to collect in the refrigerating cycle. For this reason, polyester and other synthetic oils which have a high compatibility with R410A are used as refrigerating machine oil. / Because of the high hygroscopic property of synthetic oil, more care must be taken in its handling than was necessary with conventional refrigerating machine oils. Also, these synthetic oils will degrade if mixed with mineral oil or alkylbenzene, causing clogging in capillary tubes or compressor malfunction. Do not mix them under any circumstances.

10.1.2. Safety Measure When Installing / Receiving Refrigerant Piping

Cause the gas pressure of R410A is approximately 1.6 times as high as that of R22, a mistake in installation or servicing could result in a major accident. It is essential that you use R410a tools and materials, and that you observe the following precautions to ensure safety.

1. **Do not use any refrigerant other than R410A in ACs that have been used with R410A.**
2. **If any refrigerant gas leaks while you are working, ventilate the room. Toxic gas may be generated if refrigerant gas is exposed to a direct flame.**
3. **When installing or transferring an AC, do not allow any air or substance other than R410A to mix into the refrigeration cycle. If it does, the pressure in the refrigeration cycle can become abnormally high, possibly causing an explosion and/or injury.**
4. **After finishing the installation, check to make sure there is no refrigerant gas leaking.**

5. When installing or transferring an AC, follow the instructions in the installation instructions carefully. Incorrect installation can result in an abnormal refrigeration cycle or water leakage, electric shock, fire, etc.
6. Do not perform any alterations on the AC unit under any circumstances. Have all repair work done by a specialist. Incorrect repairs can result in an water leakage, electric shock, fire, etc.

10.2. TOOL FOR INSTALLING / SERVICING REFRIGERANT PIPING

10.2.1. Necessary Tools

In order to prevent an R410A AC from mistakenly being charged with any other refrigerant, the diameter of the 3-way valve service port on the outdoor unit has been changed. Also, to increase its ability to withstand pressure, the opposing dimensions have been changed for the refrigerant pipe flaring size and flare nut. Accordingly, when installing or servicing refrigerant piping, you must have both the R410A and ordinary tools listed below.

Table 3 Tools for installation, transferring or replacement

Type of work	Ordinary tools	R410A tools
Flaring	Flaring tool (clutch type), pipe cutter, reamer	Copper pipe gauge for clearance Adjustment, flaring tool (clutch type)*1)
Bending, connecting pipes	Torque wrench (nominal diameter 1/4, 3/8,1/2) Fixed spanner (opposing sides 12 mm, 17 mm, 19 mm)Adjustable wrench, Spring bender	
Air purging	Vacuum pump Hexagonal wrench (opposing sides 4 mm)	Manifold gauge, charging hose, vacuum pump adaptor
Gas leak inspection	Gas leak inspection fluid or soapy water	Electric gas leak detector for HFC refrigerant*2)

*1) You can use the conventional (R22) flaring tool. If you need to buy a new tool, buy the R410A type.
*2) Use when it is necessary to detect small gas leaks.
For other installation work, you should have the usual tools, such as screwdrivers (+,-), a metal-cutting saw, an electrical drill, a hole core drill (65 or 70 dia.), a tape measure, a level, a thermometer, a clamp meter, an insulation tester, a voltmeter, etc.

Table 4 Tools for serving

Type of work	Ordinary tools	R410A tools
Refrigerant charging		**Electronic scale for refrigerant charging Refrigerant cylinder Charging orifice and packing for refrigerant cylinder**
Brazing (Replacing refrigerating cycle part*1)	**Nitrogen blow set (be sure to use nitrogen blowing for all brazing), and brazing), and brazing machine**	

***1) Always replace the dryer of the outdoor unit at the same time. The replacement dryer is wrapped in a vacuum pack. Replace it last among the refrigerating cycle parts. Start brazing as soon as you have opened the vacuum pack, and begin the vacuuming operation within 2 hours.**

10.2.2. R410A Tools

1. Cooper tube gauge for clearance adjustment / (used when flaring with the conventional flaring tool (clutch type))

- This gauge makes it easy to set the clearance for the copper tube to 1.0-1.5 mm from the clamp bar of the flaring tool.

2. Flaring tool (clutch type)

- In the R410A flaring tool, the receiving hole for the clamp bar is enlarged so the clearance from the clamp bar can be set to 0 -0.5 mm, and the spring inside the tool is strengthened to increase the strength of the pipe-expanding torque. This flaring tools can also be used with R22 piping, so we recommend that you select it if you are buying a new flaring tool.

3. Torque wrenches

Fig. 1 Copper tube gauge for clearance adjustment

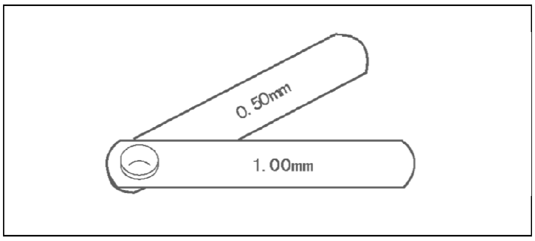


Fig. 2 Flaring tool (clutch type)

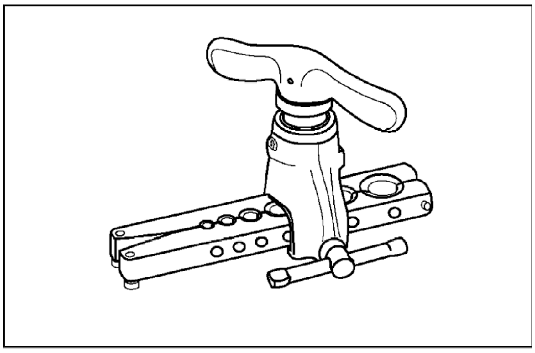


Fig. 3 Torque wrenches

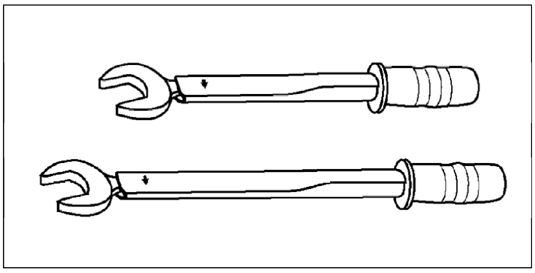


Table 5

	Conventional wrenches	R410A wrenches
For 1/4 (opposite side x torque)	17 mm x 18 N.m (180 kgf.cm)	17 mm x 18 N.m (180 kgf.cm)
For 3/3 (opposite side x torque)	22 mm x 42 N.m (180 kgf.cm)	22 mm x 42 N.m (180 kgf.cm)
For 1/2 (opposite side x torque)	24 mm x 55 N.m (180 kgf.cm)	26 mm x 55 N.m (180 kgf.cm)

4. Manifold gauge

- **Because the pressure is higher for the R410A type, the conventional type cannot be used.**

Table 6 Difference between R410A and conventional high / low-pressure gauges

	Conventional wrenches	R410A wrenches
High-pressure gauge (red)	-76 cmHg - 35 kgf/cm3	-0.1 - 5.3 Mpa -76 cmHg - 53 kgf/ cm3
High-pressure gauge (blue)	-76 cmHg - 17 kgf/cm3	-0.1 - 3.8 Mpa -76 cmHg - 38 kgf/ cm3

- **The shape of the manifold ports has been changed to prevent the possibility of mistakenly charging with another type of refrigerant.**

Table 7 Difference between R410A and conventional manifold port size

	Conventional gauges	R410A gauges
Port size	7/6 UNF 20 threads	1/2 UNF 20 threads

5. Charging hose

- The pressure resistance of the charging hose has been raised to match the higher pressure of R410A. The hose material has also been changed to suit HFC use, and the size of the fitting has been changed to match the manifold ports.

Fig. 4 Manifold gauge charging hose

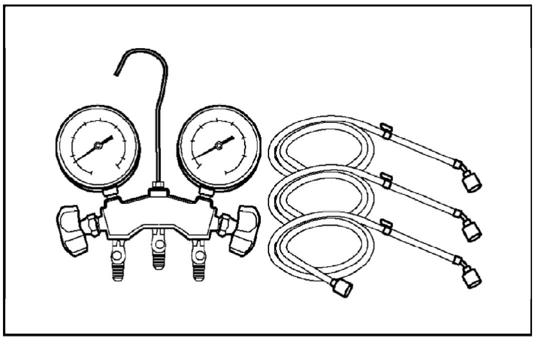


Table 8 Difference between R410A and conventional charging hoses

		Conventional hoses	R410A hoses
Pressure resistance	Working pressure	3.4 MPa (35 kgf/cm3)	5.1 MPa (52 kgf/cm3)
	Bursting pressure	17.2 MPa (175 kgf/cm3)	27.4 MPa (280 kgf/cm3)
Material		NBR rubber	HNBR rubber Nylon coating inside

6. Vacuum pump adaptor

- When using a vacuum pump for R410A, it is necessary to install an electromagnetic valve to prevent the vacuum pump oil from flowing back into the charging hose. The vacuum pump adaptor is installed for that purpose. if the vacuum pump oil (mineral oil) becomes mixed with R410A, it will damage the unit.

7. Electric gas leak detector for HFC refrigerant

- The leak detector and halide torch that were used with CFC and HCFC cannot be used with R410A (because there is no chlorine in the refrigerant).
- The present R134a leak detector can be used, but the detection sensitivity will be lower (setting the sensitivity for R134a at 1, the level for R410A will drop to 0.6).

- For detecting small amounts of gas leakage, use the electric gas leak detector for HFC refrigerant. (Detection sensitivity with R410A is about 23 g/year).

Fig. 5 Vacuum pump adaptor

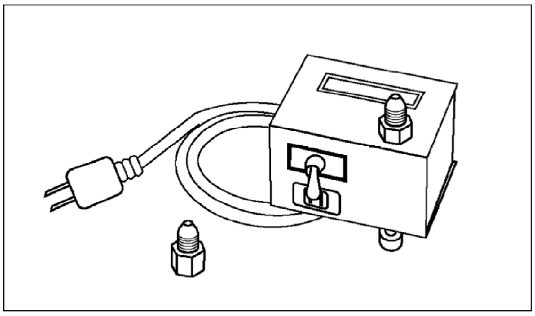
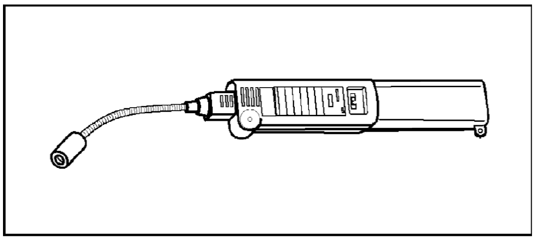


Fig. 6 Electric gas leak detector for HFC refrigerant



8. Electronic scale for refrigerant charging

- Because of the high pressure and fast vaporizing speed of R410A, the refrigerant cannot be held in a liquid phase inside the charging cylinder when charging is done using the charging cylinder method, causing bubbles to form in the measurement scale glass and making it difficult to see the reading. (Naturally, the conventional R22 charging cylinder cannot be used because of the differences in the pressure resistance, scale gradation, connecting port size, etc.)
- The electronic scale has been strengthened by using a structure in which the weight detector for the refrigerant cylinder is held by four supports. It is also equipped with two connection ports, one for R22 *7/16 UNF, 20 threads) and one for R410A (1/2 UNF, 20 threads), so it can also be used for conventional refrigerant charging.
- There are two types of electronic scales, one for 10-kg cylinders and one for 20-kg cylinders. (The 10-kg cylinder is recommended.)

  Refrigerant charging is done manually by opening and closing the valve.

9. Refrigerant cylinders

- The R410A cylinders are labeled with the refrigerant name, and the coating color of the cylinder protector is pink, which is the color stipulated by ARI of the U.S.
- Cylinder equipped with a siphon tube are available to allow the cylinder to stand upright for liquid refrigerant charging.

10. Charging orifice and packing for refrigerant cylinders

- The charging orifice must match the size of the charging hose fitting (1/2 UNF, 20 threads).
- The packing must also be made of an HFC-resistant material.

Fig. 7 Electronic scale for refrigerant charging

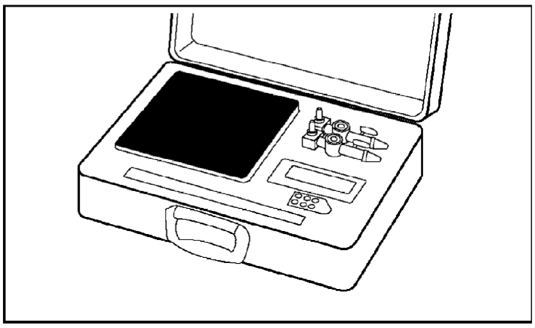


Fig. 8 Refrigerant cylinders

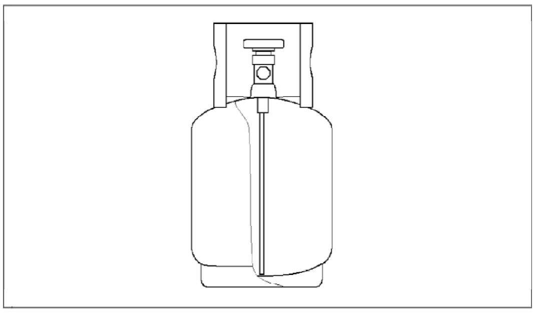
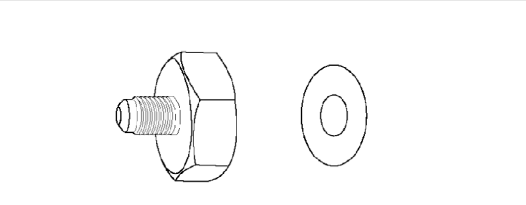


Fig. 9 Charging orifice and packing



10.2.3. R410A Tools Which Are Usable for R22 Models

Table 9 R410A tools which are usable for R22 models

	R410A tools	Usable for R22 models
(1)	Copper tube gauge for clearance adjustment	OK
(2)	Flaring tool (clutch type)	OK
(3)	Manifold gauge	NG
(4)	Charging hose	NG
(5)	Vacuum pump adaptor	OK
(6)	Electric gas leak detector for HFC refrigerant	NG
(7)	Electronic scale for refrigerant charging	OK
(8)	Refrigerant cylinder	NG
(9)	Charging orifice and packing for refrigerant cylinder	NG

10.3. REFRIGERANT PIPING WORK

10.3.1. Piping Materials

It is recommended that you use copper and copper alloy jointless pipes with a maximum oil adherence of 40 mg/10m. Do not used pipes that are crushed, deformed, or discolored (especially the inside surface). If these inferior pipes are used, impurities may clog the expansion valves or capillaries. / Because the pressure of ACs using R410A is higher than those using R22, it is essential that you select materials that are appropriate for these standards. / The thickness of the copper tubing used for R410A is shown in Table 10. Please be aware that tubing with a thickness of only 0.7 mm is also available on the market, but this should never be used.

Table 8 Difference between R410A and conventional charging hoses

Soft pipe		Thickness (mm)	
Nominal diameter	Outside diameter (mm)	R410A	(Reference) R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.7	0.80	0.80

10.3.2. Processing and Connecting Piping Materials

When working with refrigerant piping, the following points must be carefully observed: no moisture od dust must be allowed to enter the piping, and there must be no refrigerant leaks.

1. Procedure and precautions for flaring work

A. Cut the pipe / Use a pipe cutter, and cut slowly so the pipe will not be deformed.

B. Remove burrs and clean shavings from the cut surface / If the shape of the pipe end is poor after removing burrs, or if shavings adhere to the flared area, it may lead to refrigerant leaks. / To prevent this, turn the cut surface downward and remove burrs, then clean the surface, carefully.

C. Insert the flare nut (be sure to used the same nut that is used on the AC unit)

D. Flaring / Check the clamp bar and the cleanliness of the copper pipe. / Be sure to sued the clamp bar to do the flaring with accuracy. Use either an R410A flaring tool, or a conventional flaring tool. flaring tools come in different sizes, so be sure to check the size before using. When using a conventional flaring tool, use the copper pipe gauge for clearance adjustment, etc., to ensure the correct A dimension (see Fig. 10)

Fig. 10 Flaring dimensions

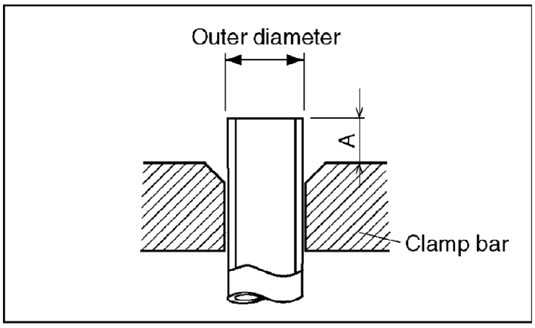
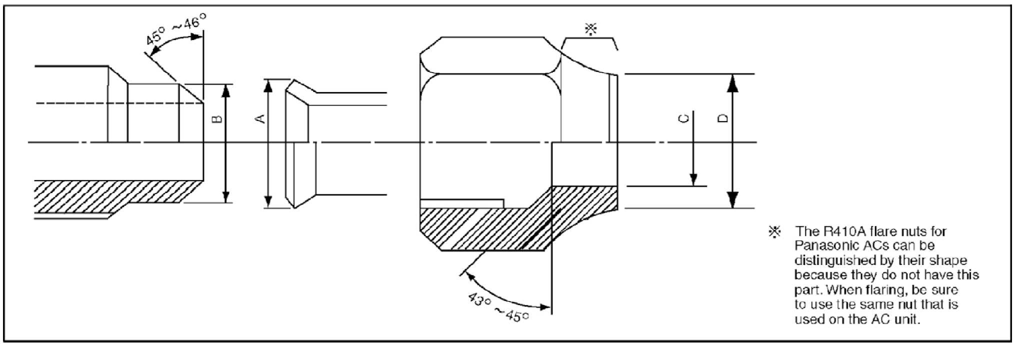


Fig. 11 Relation between the flare nut structure and flaring tool end



※ The R410A flare nuts for Panasonic ACs can be distinguished by their shape because they do not have this part. When flaring, be sure to use the same nut that is used on the AC unit.

Table 11 R410A flaring dimensions

Nominal diameter	Outside diameter (mm)	Wall thickness (mm)	A (mm)		
			R410A flaring tool, clutch type	Conventional flaring tool	
				Clutch type	Wing-nut type
1/4	6.35	0.8	0 - 0.5	1.0 - 1.5	1.5 - 2.0
3/8	9.52	0.8	0 - 0.5	1.0 - 1.5	1.5 - 2.0
1/2	12.70	0.8	0 - 0.5	1.0 - 1.5	2.0 - 2.5

Table 12 R410A flaring dimensions

Nominal diameter	Outside diameter (mm)	Wall thickness (mm)	A (mm)		
			R410A flaring tool, clutch type	Conventional flaring tool	
				Clutch type	Wing-nut type
1/4	6.35	0.8	0 - 0.5	0.5 - 1.0	1.0 - 1.5
3/8	9.52	0.8	0 - 0.5	0.5 - 1.0	1.0 - 1.5
1/2	12.70	0.8	0 - 0.5	0.5 - 1.0	1.5 - 2.0

Table 13 R410A flaring and flare nut dimensions Unit: mm

Nominal diameter	Outside diameter (mm)	Wall thickness (mm)	A +0, -0.4	B dimension	C dimension	D dimension	Flare nut width
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26

Table 14 R410A flaring and flare nut dimensions Unit: mm

Nominal diameter	Outside diameter (mm)	Wall thickness (mm)	A +0, -0.4	B dimension	C dimension	D dimension	Flare nut width
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24

2. Procedure and precautions for flare connection

A. Check to make sure there are no scratches, dust, etc., on the flare and union.

B. Align the flared surface with the axial center of the union.

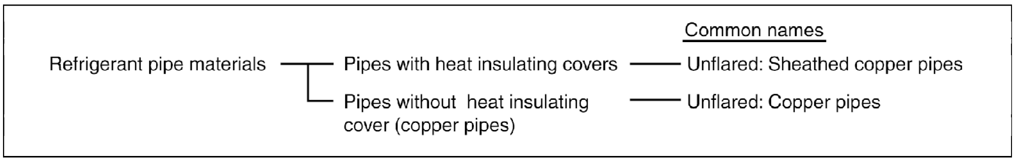
C. Use a torque wrench, and tighten to the specified torque. The tightening torque for R410A is the same as the conventional torque value for R22. Be careful, because if the torque is too weak, it may lead to a gas leak. If it is too strong, it may split the flare nut or make it impossible to remove the flare nut.

Table 15 R410A tightening torque

Nominal diameter	Outside diameter (mm)	Tightening torque N.m (kgf.cm)	Torque wrench tightening torque N.m (kgf.cm)
1/4	6.35	14 - 18 (140 - 180)	18 (180)
3/8	9.52	33 - 42 (330 -420)	42 (420)
1/2	12.70	55 (550)	55 (550)

10.3.3. Storing and managing Piping Materials

1. **Types of piping and their storage / The following is a general classification of the refrigerant pipe materials used for ACs.**


Common names
Refrigerant pipe materials
Pipes with heat insulating covers
Unflared: Sheathed copper pipes
Pipes without heat insulating cover (copper pipes)
Unflared: Copper pipes

   Because the gas pressure of R410A is approximately 1.6 times as high as that of R22, copper pipes with the thickness shown in Table 10, and with minimal impurities must be used. Care must also be taken during storage to ensure that pipes are not crushed, deformed, or scratched, and that no dust, moisture or other substance enters the pipe interior. When storing sheathed copper pipes or plain copper pipes, seal the openings by pinching or taping them securely.

2. **Makings and management**
   A. **Sheathed copper pipes and copper-element pipes / When using these pipes, check to make sure that they are the stipulated thickness. For flare nuts, be sure to used the same nut that is used on the AC unit.**
   B. **Copper pipes / Use only copper pipes with the thickness given in table 10, and with minimal impurities. Because the surface of the pipe is exposed, you should take special care, and also take measures such as marking the pipes to make sure they are easily distinguished from other piping materials, to prevent mistaken use.**

3. **Precautions during refrigerant piping work / Take the following precautions on-site when connecting pipes. (Keep in mind that the need to control the entry of moisture and dust is even more important that in conventional piping).**
   A. **Keep the open ends of all pipes sealed until connection with AC equipment is complete.**
   B. **Take special care when doing piping work on rainy days. The entering of moisture will degrade the refrigerating machine oil, and lead to malfunctions in the equipment.**

C. Complete all pipe connections in as short a time as possible. If the pipe must be left standing for a long time after removing the seal, it must be thoroughly purged with nitrogen, or dried with a vacuum pump.

10.4. INSTALLATION, TRANSFERRING, SERVICING

10.4.1. Inspecting Gas Leaks with a Vacuum Pump for New Installations (Using New Refrigerant Piping)

1. From the viewpoint of protecting the global environment, please do not release refrigerant into the atmosphere.

   A. Connect the projecting side (pin-pushing side) of the charging hose for the manifold gauge to the service port of the 3-way valve. (1)

   B. Fully open the handle Lo of the manifold gauge and run the vacuum pump. (2) (If the needle of the low-pressure gauge instantly reaches vacuum, re-check step a).)

   C. Continue the vacuum process for at least 15 minutes, then check to make sure the low-pressure gauge has reached -0.1 MPa (-76 cmHg). Once the vacuum process has finished, fully close the handle Lo of the manifold gauge and stop the vacuum pump operation, then remove the charging hose that is connected to the vacuum pump adaptor. (Leave the unit in that condition for 1-2 minutes, and make sure that the needle of the manifold gauge does not return.) (2) and (3)

   D. Turn the valve stem of the 2-way valve 90 counter-clockwise to open it, then, after 10 seconds, close it and inspect for a gas leak (4)

   E. Remove the charging hose from the 3-way valve service port, then open both the 2-way valve and 3-way valve. (1) (4) (Turn the valve stem in the counter-clockwise direction until it gently makes contact. Do not turn it forcefully).

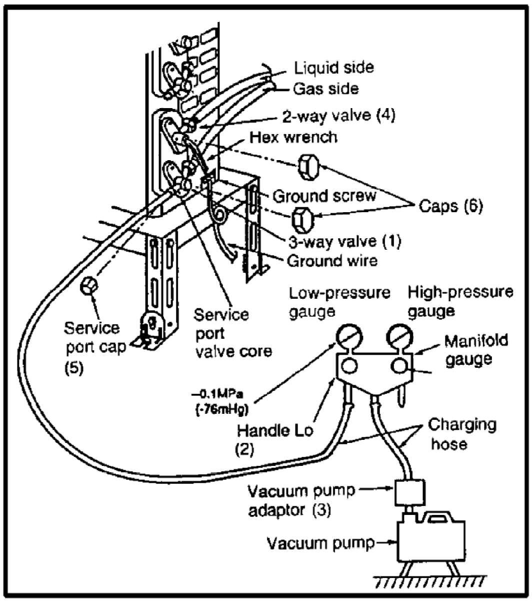
   F. Tighten the service port cap with a torque wrench (18 N.m (1.8 kgf.m)). (5) Then tighten the 2-way valve and 3-way valve caps with a torque wrench (42 N.m (4.2 kgf.m)) or (55 N.m (5.5 kgf.m)).

   G. After attaching each of the caps, inspect for a gas leak around the cap area. (5) (6)

Precautions

- Be sure to read the instructions for the vacuum pump, vacuum pump adaptor and manifold gauge prior to use, and follow the instructions carefully.
- Make sure that the vacuum pump is filled with oil up to the designated line on the oil gauge.
- The gas pressure back flow prevention valve on the charging hose is generally open during use. When you are removing the charging hose from the service port, it will come off more easily if you close this valve.

Fig. 12 Vacuum pump air purging configuration


Liquid side
Gas side
2-way valve (4)
Hex wrench
Ground screw
Caps (6)
3-way valve (1)
Ground wire
Low-pressure gauge
High-pressure gauge
Service port cap (5)
Service port valve core
Manifold gauge
–0.1MPa (-76mHg)
Handle Lo (2)
Charging hose
Vacuum pump adaptor (3)
Vacuum pump

10.4.2. Transferring (Using New Refrigerant Piping)

1. Removing the unit

A. Collecting the refrigerant into the outdoor unit by pumping down / The refrigerant can be collected into the outdoor unit (pumping down) by pressing the TEST RUN button, even when the temperature of the room is low.

- Check to make sure that the valve stems of the 2-way valve and 3-way valve have been opened by turning them counter-clockwise. (Remove the valve stem caps and check to see that the valve stems are fully opened position. Always use a hex wrench (with 4-mm opposing sides) to operate the valve stems.)

- Press the TEST RUN button on the indoor unit, and allow preliminary for 5-6 minutes. (TEST RUN mode)
- After stopping the operation, let the unit sit for about 3 minutes, then close the 2-way valve by turning the valve stem in the clockwise direction.
- Press the TEST RUN button on the indoor unit again, and after 2-3 minutes of operation, turn the valve stem of the 3-way valve quickly in the clockwise direction to close it, then stop the operation.
- Tighten the caps of the 2-way valve and 3-way valve to the stipulated torque.
- Remove the connection pipes (liquid side and gas side).

2. Installing the unit / Install the unit using new refrigerant piping. Follow the instructions in section 4.1 to evacuate the pipes connecting the indoor and outdoor units, and the pipes of the indoor unit, and check for gas leaks.

10.4.3. AC Units Replacement (Using Existing Refrigerant Piping)

When replacing and R410A AC unit with another R410A AC unit, you should re-flare the refrigerant piping. Even though the replacement AC unit uses the R410A, problems occur when, for example, either the AC unit maker or the refrigerating machine oil is different. / When replacing an R22 AC unit with an R410A AC unit, the following checks and cleaning procedures are necessary but are difficult to do because of the chemical characteristics of the refrigerating machine oil (as described in items c) and d) of section 10.1.1.(2)). In this case, you should use new refrigerant piping rather than the existing piping.

1. Piping check / Because of the different pressure characteristics of R22 and R410A, the design pressure for the equipment is 1.6 times different. the wall thickness of the piping must comply with that shown in Table 10, but this is not easy to check. Also, even if the thickness is correct, there may be flattened or bent portions midway through the piping due to sharp curves. Buried sections of the piping also cannot be checked.

2. Pipe cleaning / A large quantity of refrigerating machine oil (mineral oil) adheres to existing pipes due to the refrigeration cycle circulation. If the pipes are used just as they are for the R410A cycle, the capacity will be lowered due to the incompatibility of this oil with the R410A, or irregularities may occur in the refrigeration cycle. For this reason, the piping must

be thoroughly cleaned, but this is difficult with the present technology.

10.4.4. Refrigerant Compatibility (Using R410A Refrigerant in R22 ACs and Vice Versa)

Do not operate an existing R22 AC with the new R410A refrigerant. Doing so would result in improper functioning of the equipment or malfunction, and might lead to a major accident such as an explosion in the refrigeration cycle. Similarly, do not operate an R410A AC with R22 refrigerant. The chemical reaction between the refrigerating machine oil used in R410A ACs and the chlorine that is contained in R22 would cause the refrigerating machine oil to degrade and lead to malfunction.

10.4.5. Recharging Refrigerant During Servicing

When recharging is necessary, insert the specified amount of new refrigerant in accordance with the following procedure.

1. Connect the charging hose to the service port of the outdoor unit.
2. Connect the charging hose to the vacuum pump adaptor. At this time, fully open the 2-way valve and 3-way valve.
3. Fully open the handle Lo of the manifold gauge, turn on the power of the vacuum pump and continue the vacuum process for at least one hour.
4. Confirm that the low pressure gauge shows a reading of -0.1 Mpa (-76 cmHg), then fully close the handle Lo, and turn off the vacuum pump. Wait for 1-2 minutes, then check to make sure that the needle of the Low pressure gauge has not returned. See Fig. 13 for the remaining steps of this procedure.
5. Set the refrigerant cylinder onto the electronic scale, then correct the hose the cylinder and to the connection port for the electronic scale. (1)(2)

   Precaution:

   Be sure to set up the cylinder for liquid charging. If you use a cylinder equipped with a siphon tube, you can charge the liquid without having to turn the cylinder around
6. Remove the charging hose of the manifold gauge from the vacuum pump adaptor, and connect it to the connection port of the electronic scale. (2)(3)
7. Open the valve of the refrigerant cylinder, then open the charging valve slightly and close it. Next, press the check valve of the

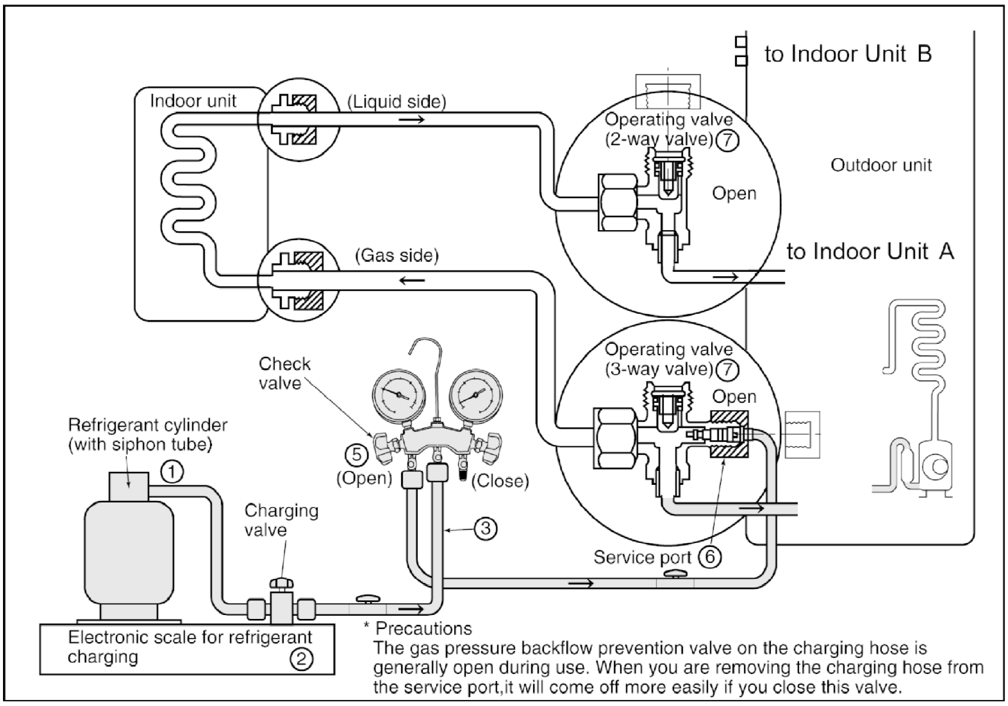
manifold gauge and purge the air. (2)(4) (Watch the liquid refrigerant closely at this point.)

8. **After adjusting the electronic scale to zero, open the charging valve, then open the valve Lo of the manifold gauge and charge with the liquid refrigerant. (2)(5) (Be sure to read the operating instructions for the electronic scale.)**
9. **If you cannot charge the stipulated amount, operate the unit in the cooling mode while charging a little of the liquid at a time (about 150 g/time as a guideline). If the charging amount is insufficient from one operation, wait about one minute, then use the same procedure to do the liquid charging again.**

   Precaution:

   Never use the gas side to allow a larger amount of liquid refrigerant to be charged while operating the unit.
10. **Close the charging valve, and after charging the liquid refrigerant inside the charging hose, fully close the valve Lo of the manifold gauge, and stop the operation of the unit. (2)(5)**
11. **Quickly remove the charging hose from the service port. (6) If you stop midway through, the refrigerant that is in the cycle will be discharged.**
12. **After putting on the caps for the service port and operating valve, inspect around the caps for a gas leak. (6)(7)**

Fig. 13 Re-charging refrigerant


to Indoor Unit B
Indoor unit
(Liquid side)
Operating valve
(2-way valve)⑦
Outdoor unit
Open
to Indoor Unit A
(Gas side)
Operating valve
(3-way valve)⑦
Open
Check
valve
Refrigerant cylinder
(with siphon tube)
①
⑤
(Open)
(Close)
Charging
valve
③
Service port ⑥
Electronic scale for refrigerant
charging ②

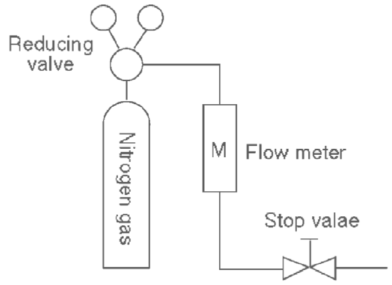
* Precautions
The gas pressure backflow prevention valve on the charging hose is generally open during use. When you are removing the charging hose from the service port,it will come off more easily if you close this valve.

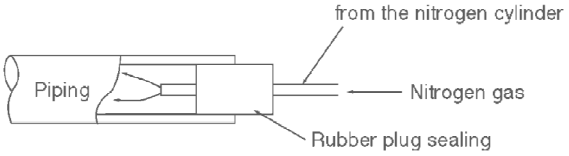
10.4.6. Brazing

As brazing requires sophisticated techniques and experiences, it must be performed by a qualified person. / In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry nitrogen gas (N2) flow.

<Brazing Method for Preventing Oxidation>

1. **Attach a reducing valve to the nitrogen gas cylinder.**
2. **Attach a reducing valve to the nitrogen gas cylinder.**
3. **Apply a seal onto the clearance between the piping and inserted pipe for the nitrogen gas in order to prevent the nitrogen gas from flowing backward.**
4. **When the nitrogen gas is flowing, be sure to keep the piping end open.**
5. **Adjust the flow rate of nitrogen gas so that it is lower than 0.05 m^3/ h, or 0.02 MPa (0.2 kgf/cm^2) by means of the reducing valve.**
6. **After taking the steps above, keep the nitrogen gas flowing until the piping cools down to a certain extent (i.e. temperature at which pipes are touchable with finger).**
7. **Completely remove the flux after brazing.**





Cautions during brazing

1. General Cautions
   - A. The brazing strength should be high as required.
   - B. After operation, airtightness should be kept under pressurized condition.
   - C. During brazing do not allow component materials to become damaged due to overheating.
   - D. The refrigerant pipe work should not become blocked with scale or flux.
   - E. The brazed part should not restrict the flow in the refrigerant circuit.
   - F. No corrosion should occur from the brazed part.

2. Preventing of Overheating

   Due to heating, the interior and exterior surfaces of treated metal may oxidize. Especially, when the interior of the refrigerant circuit oxidizes due to overheating, scale occurs and stays in the circuit as dust, thus exerting a fatally adverse effect. So, make brazing at adequate brazing temperature and with minimum of heating area.

3. Overheating Protection

   In order to prevent components near the brazed part from overheating damaged or quality deterioration due to flame or heat, take adequate steps for protection such as (1) by shielding with a metal plate, (2) by using a wet cloth, and (3) by means of heat absorbent.

4. Movement during Brazing

   Eliminate all vibration during brazing to protect brazed joints from cracking and breakage.

5. Oxidation Preventative

   In order to improve the brazing efficiency, various types of

antioxidant are available on the market. However, the constituents of these are widely varied, and some are anticipated to corrode the piping materials, or adversely affect HFC refrigerant, lubricating oil, etc. Exercise care when using an oxidation preventive.

10.4.7. Servicing Tips

The drier must also be replaced whenever replacing the refrigerant cycle parts. Replacing the refrigerant cycle parts first before replacing the drier. The drier is supplied in a vacuum pack. Perform brazing immediately after opening the vacuum pack, and then start the vacuum within two hours. In addition, the drier also needs to be replaced when the refrigerant has leaked completely.

11. Installation Instructions

Required tools for Installation Works			
1. Philips screw driver	5. Spanner	9. Gas leak detector	13. Multimeter
2. Level gauge	6. Pipe cutter	10. Measuring tape	14. Torque wrench 18 N.m (1.8 kgf.m) 42 N.m (4.2 kgf.m) 55 N.m (5.5 kgf.m)
3. Electric drill, hole core drill (ø70 mm)	7. Reamer	11. Thermometer	15. Vacuum pump
4. Hexagonal wrench (4 mm)	8. Knife	12. Megameter	16. Gauge manifold

11.1. Safety Precautions

- **Read the following “SAFETY PRECAUTIONS” carefully before installation.**
- **Electrical work must be installed by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model to be installed.**
- **The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.**

⚠ **WARNING**	**This indication shows the possibility of causing death or serious injury.**

⚠ **CAUTION**	**This indication shows the possibility of causing injury or damage to prop**

The items to be followed are classified by the symbols:

⊘	**Symbol with background white denotes item that is PROHIBITED from do**

- Carry out test running to confirm that no abnormality occurs after the installation. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

	⚠ **WARNING**
1.	**Engage dealer or specialist for installation. If installation done by the user is defective, it will c water leakage, electrical shock or fire.**
2.	**Install according to this installation instruction strictly. If installation is defective, it will cause leakage, electrical shock or fire.**
3.	**Use the attached accessories parts and specified parts for installation. Otherwise, it will cause to fall, water leakage, fire or electrical shock.**
4.	**Install at a strong and firm location which is able to withstand the set's weight. If the strength i enough or installation is not properly done, the set will drop and cause injury.**
5.	**For electrical work, follow the local national wiring standard, regulation and this installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity enough or defect found in electrical work, it will cause electrical shock or fire.**
6.	**Use the specified cable (1.5 mm2) and connect tightly for indoor/outdoor connection. Connect and clamp the cable so that no external force will be acted on the terminal. If connection or fixi perfect, it will cause heat-up or fire at the connection.**
7.	**Wire routing must be properly arranged so that control board cover is fixed properly. If control cover is not fixed perfectly, it will cause heat-up at connection point of terminal, fire or electric**
8.	**When carrying out piping connection, take care not to let air substances other than the specifi refrigerant go into refrigeration cycle. Otherwise, it will cause lower capacity, abnormal high p in the refrigeration cycle, explosion and injury.**
9.	**When connecting the piping, do not allow air or any substances other than the specified refrigerant (R410A) to enter the refrigeration cycle. Otherwise, this may lower the capacity, cause abnormally high pressure in the refrigeration cycle, and possibly result in explosion and injury.**
10.	**-When connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A materials.** **-Thickness of copper pipes used with R410A must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm.** **-It is desirable that the amount of residual oil is less than 40 mg/10 m.**

WARNING

11. **Do not modify the length of the power supply cord or use of the extension cord, and do not share the single outlet with other electrical appliances. Otherwise, it will cause fire or electrical shock.**

CAUTION

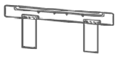
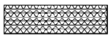
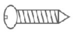
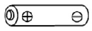
1. **The equipment must be earthed. It may cause electrical shock if grounding is not perfect.**
2. **Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.**
3. **Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, enter the room and damage the furniture.**

ATTENTION

1. **Selection of the installation location.**
   Select a installation location which is rigid and strong enough to support or hold the unit, and location for easy maintenance.
2. **Power supply connection to the room air conditioner.**
   Connect the power supply cord of the room air conditioner to the mains using one of the follo method.
   Power supply point shall be the place where there is ease for access for the power disconnect case of emergency.
   In some countries, permanent connection of this room air conditioner to the power supply is

   1. Power supply connection to the receptacle using a power plug. / Use an approved 15A/16A power plug with earth pin for the conne socket.
   2. Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A circuit breaker for the permanen It must be a double pole switch with a minimum 3 mm contact gap.
3. **Do not release refrigerant.**
   Do not release refrigerant during piping work for installation, reinstallation and during repairin refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.
4. **Installation work.**
   It may need two people to carry out the installation work.
5. **Do not install this appliance in a laundry room or other location where water may drip from the etc.**

Attached accessories

No.	Accesories part	Qty.	No.	Accesories part	Qty.
1	Installation plate 	1	6	Solar refreshing deodorizing filter 	1
2	Installation plate fixing screw 	6	7	Remote Control holder 	1
3	Remote control 	1	8	Remote Control holder fixing screw 	2
4	Battery 	2	9	Drain elbow (E9BK, E12BK) 	1
5	Air purifying filter 	1			

Applicable piping kit
CZ-3F5, 7AEN (E9BK)
CZ-4F5, 7, 10AN (E12BK)

SELECT THE BEST LOCATION

INDOOR UNIT

- **There should not be any heat source or steam near the unit.**
- **There should not be any obstacles blocking the air circulation.**
- **A place where air circulation in the room is good.**
- **A place where drainage can be easily done.**
- **A place where noise prevention is taken into consideration.**
- **Do not install the unit near the door way.**
- **Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.**
- **Recommended installation height for indoor unit shall be at least 2.3 m.**

OUTDOOR UNIT

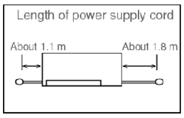
- **If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.**
- **There should not be any animal or plant which could be affected by hot air discharged.**
- **Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.**

- Do not place any obstacles which may cause a short circuit of the discharged air.

- If piping length is over the common length, additional refrigerant should be added as shown in the table.

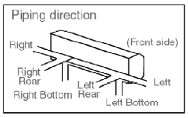
Model	Piping size		Common Length (m)	Max. Elevation (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid				
E9BK	**3/8”**	**1/4”**	**7.5**	**5**	**10**	**10**
E12BK	**1/2”**	**1/4”**	**7.5**	**5**	**15**	**10**

Indoor/Outdoor Unit Installation Diagram



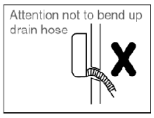
Length of power supply cord

About 1.1 m
About 1.8 m

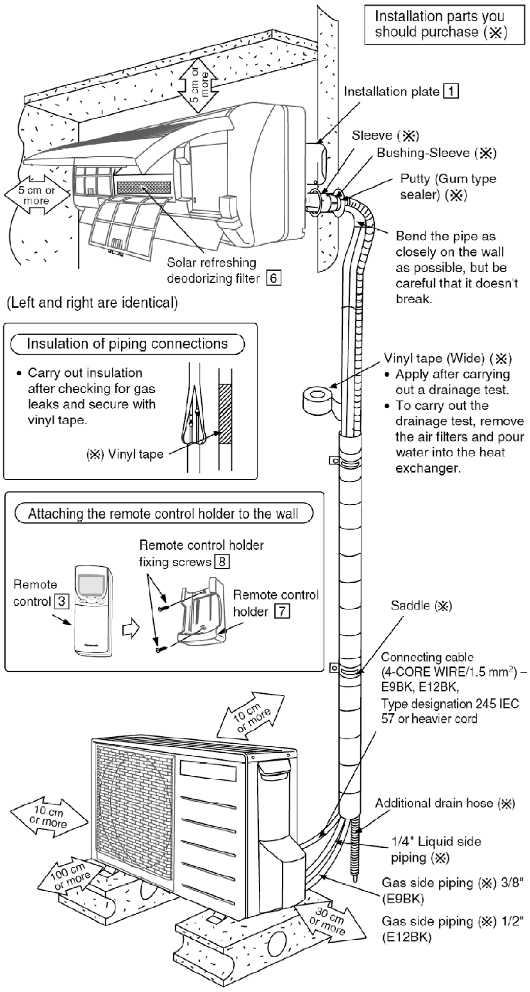


Piping direction

Right
(Front side)
Right Rear
Right Bottom
Left Rear
Left
Left Bottom



Attention not to bend up drain hose


Installation parts you should purchase (※)
5 cm or more
Installation plate 1
Sleeve (※)
Bushing-Sleeve (※)
Putty (Gum type sealer) (※)
5 cm or more
Bend the pipe as closely on the wall as possible, but be careful that it doesn't break.
Solar refreshing deodorizing filter 6
(Left and right are identical)
Insulation of piping connections
• Carry out insulation after checking for gas leaks and secure with vinyl tape.
(※) Vinyl tape
Vinyl tape (Wide) (※)
• Apply after carrying out a drainage test.
• To carry out the drainage test, remove the air filters and pour water into the heat exchanger.
Attaching the remote control holder to the wall
Remote control holder fixing screws 8
Remote control 3
Remote control holder 7
Saddle (※)
Connecting cable (4-CORE WIRE/1.5 mm²) – E9BK, E12BK, Type designation 245 IEC 57 or heavier cord
10 cm or more
10 cm or more
Additional drain hose (※)
1/4" Liquid side piping (※)
100 cm or more
Gas side piping (※) 3/8" (E9BK)
30 cm or more
Gas side piping (※) 1/2" (E12BK)

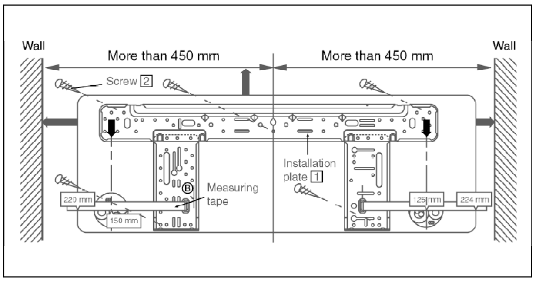
- This illustration is for explanation purposes only. / The indoor unit will actually face a different way.

11.2. INDOOR UNIT

11.2.1. SELECT THE BEST LOCATION / (Refer to “Select the best location” section)

11.2.2. HOW TO FIX INSTALLATION PLATE

The mounting wall is strong and solid enough to prevent it from the vibration.


Wall
More than 450 mm
More than 450 mm
Wall
Screw 2
Installation plate 1
B
Measuring tape
220 mm
150 mm
125 mm
224 mm

The centre of installation plate should be at more than 450 mm at right and left of the wall.
The distance from installation plate edge to ceiling should more than 67 mm.
From installation plate left edge to unit’s left side is 47 mm.

From installation plate right edge to unit’s right is 73 mm.

Ⓑ : **For left side piping, piping connection for liquid should be about 14 mm from this line.**

For left side piping, piping connection for
: **gas should be about 56 mm from this line.**

For left side piping, piping connecting cable should be about 785 mm from this line.

:

1. Mount the installation plate on the wall with 5 screws or more. / (If mounting the unit on the concrete wall consider using anchor bolts.)

- **Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.**

2. Drill the piping plate hole with ø70 mm hole-core drill.

- **Line according to the arrows marked on the lower left and right side of the installation plate. The meeting point of the extended line is the centre of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole centre is obtained by measuring the distance namely 150 mm and 125 mm for left and right hole respectively.**

- **Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.**

11.2.3. TO DRILL A HOLE IN THE WALL AND INSTALL A SLEEVE OF PIPING

1. Insert the piping sleeve to the hole.

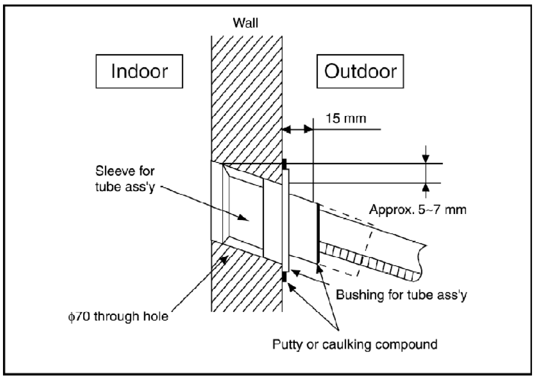
2. Fix the bushing to the sleeve.

3. Cut the sleeve until it extrudes about 15 mm from the wall.

Caution

When the wall is hollow, please be sure to use the sleeve for tube ass’y to prevent dangers caused by mice biting the connecting cable.

4. Finish by sealing the sleeve with putty or caulking compound at the final stage.


Wall
Indoor
Outdoor
15 mm
Sleeve for tube ass'y
Approx. 5~7 mm
Bushing for tube ass'y
ϕ70 through hole
Putty or caulking compound

11.2.4. INDOOR UNIT INSTALLATION

1. For the right rear piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Secure the Indoor Unit
↓
Insert the connecting cable

2. For the right and right bottom piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Insert the connecting cable
↓
Secure the Indoor Unit

3. For the embedded piping

Replace the drain hose

Bend the embedded piping

- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.

Install the Indoor Unit

Cut and flare the embedded piping

- When determing the dimension of the piping, slide the unit all the way to the left on the installation plate.
  Refer to the section "Cutting and flaring the piping".

Pull the connecting cable into Indoor Unit

- The inside and outside connecting cable can be connected without removing the front grille.

Connect the piping

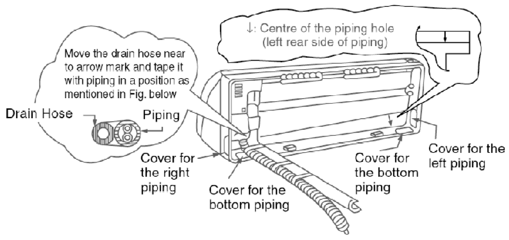
- Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)

Insulate and finish the piping

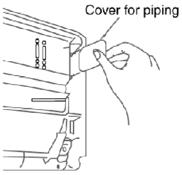
- Please refer to "Piping and finishing" column of outdoor section and "Insulation of piping connections" column as mentioned in Indoor/ Outdoor Unit Installation.

Secure the Indoor Unit

Pull out the piping and drain hose


↓: Centre of the piping hole
(left rear side of piping)
Move the drain hose near to arrow mark and tape it with piping in a position as mentioned in Fig. below
Drain Hose
Piping
Cover for the right piping
Cover for the bottom piping
Cover for the bottom piping
Cover for the left piping

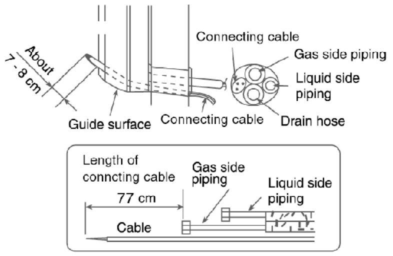
How to keep the cover


Cover for piping

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.

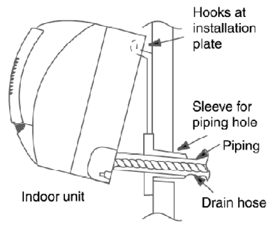
(Left, right and 2 bottom covers for piping)

Insert the connecting cable


About 7 - 8 cm
Connecting cable
Gas side piping
Liquid side piping
Guide surface
Connecting cable
Drain hose
Length of conncting cable
77 cm
Cable
Gas side piping
Liquid side piping

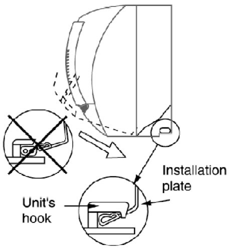
Install the Indoor Unit

Hook the indoor unit onto the upper portion of installation plate (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving in left and right.

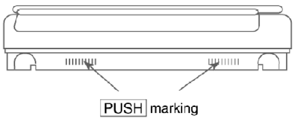

Hooks at installation plate
Sleeve for piping hole
Piping
Indoor unit
Drain hose

Secure the Indoor Unit

1. Tape the extra power supply cord in a bundle and keep it behind the chassis.
   - Ensure that the power supply cord is not clamped in between the unit's hook (2 positions) and installation plate.
2. Press the lower left and right side of the unit against the installation plate until hooks engages with their slots (sound click).


Installation plate
Unit's hook

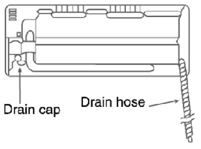
To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

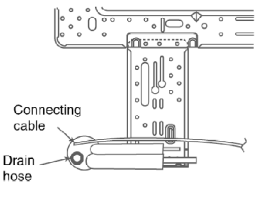

PUSH marking

(This can be used for left rear piping & left bottom piping also.)

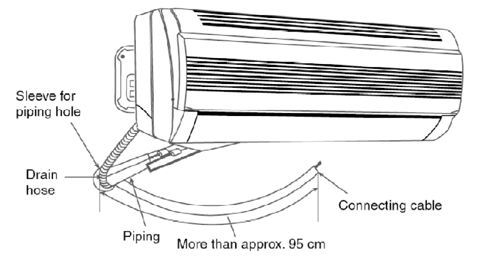
Exchange the drain hose and the cap

Refer view for left piping installation

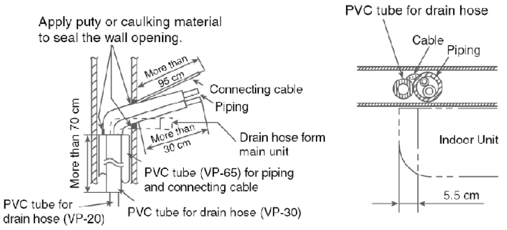

Drain cap
Drain hose


Connecting cable
Drain hose

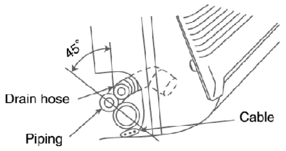
Adjust the piping slightly downwards


Sleeve for piping hole
Drain hose
Connecting cable
Piping
More than approx. 95 cm

- How to pull the piping and drain hose out, in case of the embedded piping.


Apply puty or caulking material to seal the wall opening.
More than 95 cm
Connecting cable
Piping
More than 70 cm
More than 30 cm
Drain hose form main unit
PVC tube (VP-65) for piping and connecting cable
PVC tube for drain hose (VP-20)
PVC tube for drain hose (VP-30)
PVC tube for drain hose
Cable
Piping
Indoor Unit
5.5 cm

- In case of left piping how to insert the connecting cable and drain hose.


45°
Drain hose
Piping
Cable

(For the right piping, follow the same procedure)

11.2.5. CONNECT THE CABLE TO THE INDOOR UNIT

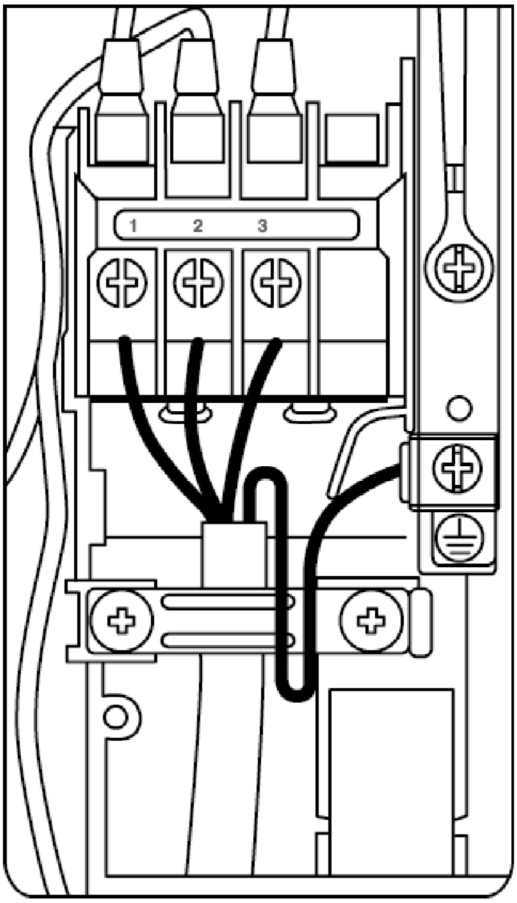
1. **The inside and outside connecting cable can be connected without removing the front grille.**
2. **Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 (E9BK, E12BK) × 1.5 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord.**

- Ensure the color of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.

- Earth lead wire shall be longer than the other lead wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage. /

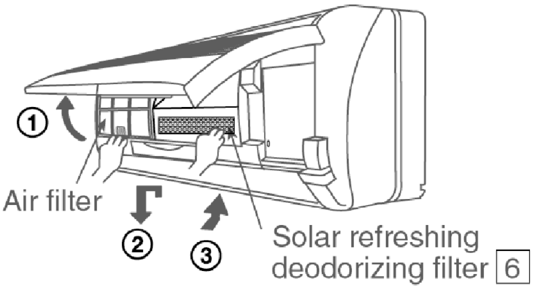
Terminals on the indoor unit	1	2	3	⏚
Color of wires	▨	▨	▨	▨
Terminals on the outdoor unit	1	2	3	⏚

- Secure the cable onto the control board with the holder (clamper).



INSTALLATION OF AIR PURIFYING FILTERS

1. **Open the front panel.**
2. **Remove the air filters.**
3. **Put air purifying filters (left) and solar refreshing deodorizing filter (right) into place as shown in illustration below.**

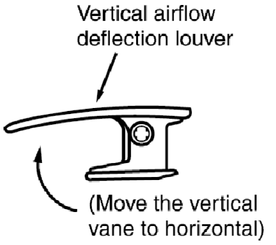

①
Air filter
②
③
Solar refreshing deodorizing filter 6

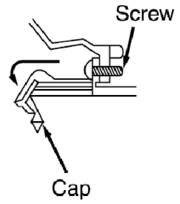
HOW TO TAKE OUT FRONT GRILLE

Please follow the steps below to take out front grille if necessary such as when servicing.

1. **Set the vertical airflow direction louver to the horizontal position.**
2. **Slide down the two caps on the front grille as shown in the illustration below, and then remove the two mounting screws.**
3. **Pull the lower section of the front grille towards you to remove the front grille.**

When reinstalling the front grille, first set the vertical airflow direction louver to the horizontal position and then carry out above steps 2 - 3 in the reverse order.


Vertical airflow deflection louver
(Move the vertical vane to horizontal)



AUTO SWITCH OPERATION

The below operations will be performed by pressing the "AUTO" switch.

1. **AUTO OPERATION MODE**
   The Auto operation will be activated immediately once the Auto Switch is pressed.
2. **TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)**
   The Test Run operation will be activated if the Auto Switch is pressed continuously for more than 5 sec. to below 10 sec.. A "pep" sound will occur at the fifth sec., in order to identify the starting of Test Run operation
3. **HEATING CONTROLLER RECEIVING SOUND ON/OFF**

The ON/OFF of remote controller receiving sound can be changed over by following steps:

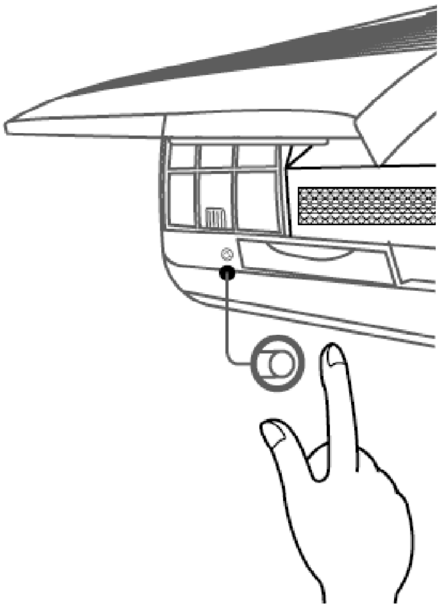
4. REMOTE CONTROLLER RECEIVING SOUND ON/OFF

The ON/OFF of remote controller receiving sound can be changed over by following steps:

A. Press "AUTO" switch continuously for more than 16 sec. to below 21 sec. A "pep" "pep" sound will occur at sixteenth sec..

B. Press the "Check" button once at remote controller. A "pep" sound will occur.

C. Press the "AUTO" switch once to select remote controller receiving sound ON/OFF. A "pep" sound indicates receiving sound ON, and a "pep" sound indicates receiving sound OFF.



11.3. OUTDOOR UNIT

11.3.1. SELECT THE BEST LOCATION / (Refer to "Select the best location" section)

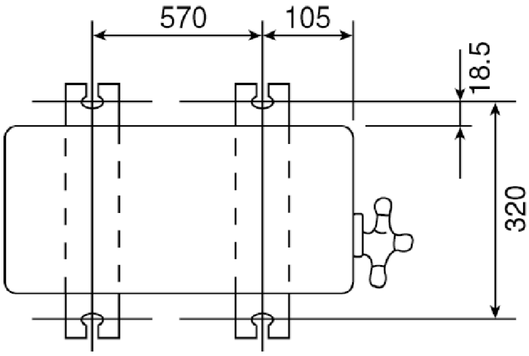
11.3.2. INSTALL THE OUTDOOR UNIT

- After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.

1. Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut. (ø10 mm).

2. When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or

nails.



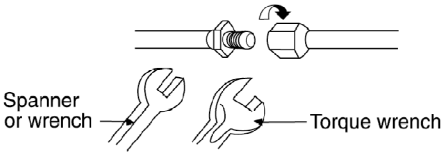
11.3.3. CONNECTING THE PIPING

Connecting The Piping To Indoor Unit

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

Connect the piping

- **Align the center of piping and sufficiently tighten the flare nut with fingers.**
- **Further tighten the flare nut with torque wrench in specified torque as stated in the table.**



MODEL	Piping size (Torque)	
	Gas	Liquid
E9BK	3/8” (42 N.m)	1/4” (18 N.m)
E12BK	1/2” (55 N.m)	1/4” (18 N.m)

Connecting The Piping To Outdoor Unit

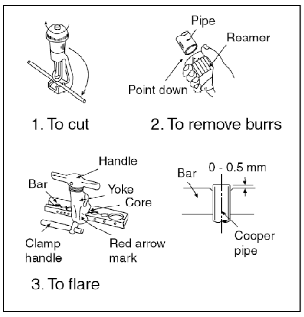
Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (located at valve) onto the copper pipe.

Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

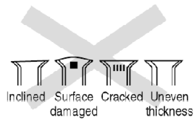
CUTTING AND FLARING THE PIPING

1. **Please cut using pipe cutter and then remove the burrs.**
2. **Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.**
   Turn the piping end down to avoid the metal powder entering the pipe.
3. **Please make flare after inserting the flare nut onto the copper**

pipes.


Pipe
Reamer
Point down
1. To cut
2. To remove burrs
Handle
Bar
Yoke
Core
Clamp handle
Red arrow mark
Bar
0 - 0.5 mm
Cooper pipe
3. To flare

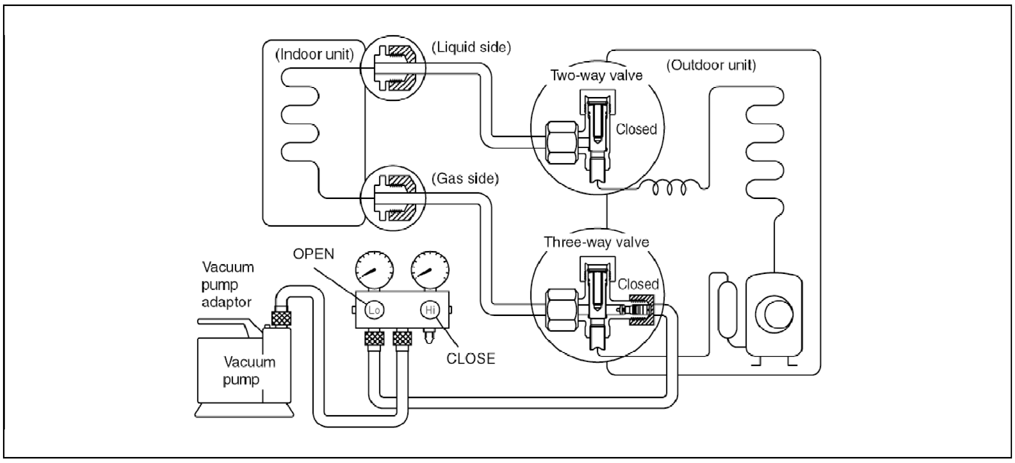
■ Improper flaring ■


Inclined
Surface damaged
Cracked
Uneven thickness

When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

11.3.4. (a) EVACUATION OF THE EQUIPMENT (FOR EUROPE & OCEANIA DESTINATION)

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.


(Indoor unit)
(Liquid side)
Two-way valve
(Outdoor unit)
Closed
(Gas side)
Three-way valve
Closed
OPEN
Vacuum pump adaptor
Lo
Hi
CLOSE
Vacuum pump

1. **Connect a charging hose with a push pin to the Low and High side of a charging set and the service port of the 3-way valve.**

   - Be sure to connect the end of the charging hose with the push pin to the service port.

2. **Connect the center hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.**
3. **Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 MPa) to / -76 cmHg (-0.1 MPa). Then evacuate the air approximately ten minutes.**
4. **Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.**

Note: BE SURE TO FOLLOW THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.

5. **Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.**
6. **Tighten the service port caps of the 3-way valve at torque of 18 N.m with a torque wrench.**
7. **Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to “OPEN” using a hexagonal wrench (4 mm).**
8. **Mount valve caps onto the 2-way valve and the 3-way valve.**

- Be sure to check for gas leakage.

CAUTION

- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step 3 above ta
following measure:

- If the leak stops when the piping connections are tightened further, continue working from ste

- If the leak does not stop when the connections are retightened, repair the location of leak.

- Do not release refrigerant during piping work for installation and reinstallation. Take care of th
liquid refrigerant, it may cause frostbite.

11.3.5. CONNECT THE CABLE TO THE OUTDOOR UNIT

1. **Remove the control board cover from the unit by loosening the screw.**
2. **Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 (E9BK, E12BK) × 1.5 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord.**

Terminals on the indoor unit	1	2	3	⏚
Color of wires	░	▒	▓	█
Terminals on the outdoor unit	1	2	3	⏚

3. **Secure the cable onto the control board with the holder (clamper).**
4. **Attach the control board cover back to the original position with the screw.**

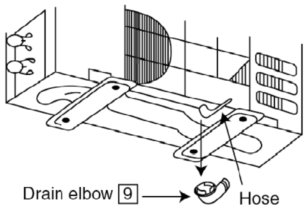
11.3.6. PIPE INSULATION

1. **Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.**
2. **If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.**

DISPOSAL OF OUTDOOR UNIT DRAIN WATER

- **If a drain elbow is used, the unit should be placed on a stand which is taller than 3 cm.**
- **If the unit is used in an area where temperature falls below 0°C for 2 or 3 days in succession, it is recommended not to use a drain elbow, for the drain water freezes and the fan will not rotate.**

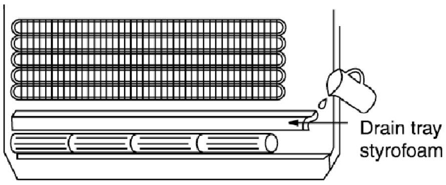
CU-E9BK, E12B



Install the hose at an angle so that the water smoothly flows out.

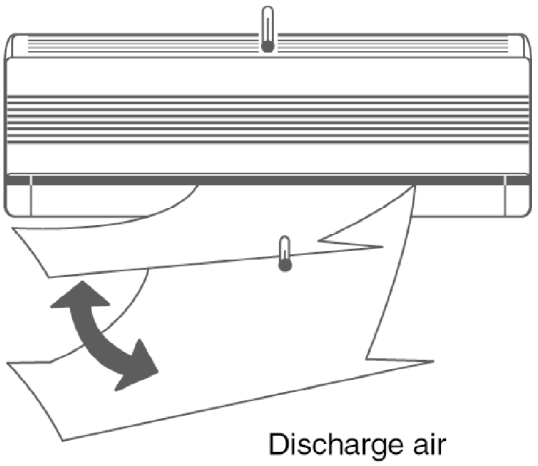
CHECK THE DRAINAGE

- **Open front panel and remove air filters. / (Drainage checking can be carried out without removing the front grille.)**
- **Pour a glass of water into the drain tray-styrofoam.**
- **Ensure that water flows out from drain hose of the indoor unit.**



EVALUATION OF THE PERFORMANCE

- **Operate the unit at cooling operation mode for fifteen minutes or more.**
- **Measure the temperature of the intake and discharge air.**
- **Ensure the difference between the intake temperature and the discharge is more than 8°C.**



CHECK ITEMS

☐ **Is there any gas leakage at flare nut connections?**

☐ **Has the heat insulation been carried out at flare nut connection?**

☐ **Is the connecting cable being fixed to terminal board firmly?**

☐ **Is the connecting cable being clamped firmly?**

☐ **Is the drainage OK?**
(Refer to “Check the drainage” section)

☐ **Is the earth wire connection properly done?**

☐ **Is the indoor unit properly hooked to the installation plate?**

☐ **Is the power supply voltage complied with rated value?**

☐ **Is there any abnormal sound?**

☐ **Is the cooling operation normal?**

☐ **Is the thermostat operation normal?**

☐ **Is the remote control’s LCD operation normal?**

☐ **Is the air purifying filter installed?**

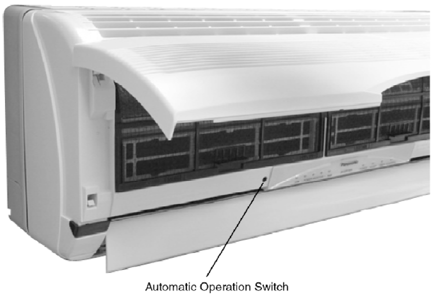
12. Servicing Information

12.1. Troubleshooting

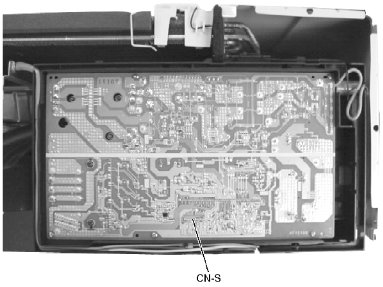
1.
Rated Frequency Operation

During troubleshooting and servicing, rated compressor operating frequency must be obtained in order to check the specification and technical data. Below are the methods used to obtain rated compressor operating specification.
(a) Cooling

(i) Press the Auto button continuously for 5 seconds or less than 8 seconds, the air condition
operation at Cooling rated frequency. (“beep” will be heard at the 5th second.)



(ii) Short the service terminal (CN-S) of the outdoor printed circuit board. The operation of air conditioner is Cooling rated frequency.



(b) Heating

Press the Auto button continuously for 8 seconds or less than 11 seconds, the air conditioner starts operation at Heating rated frequency. (“beep” “beep” will be heard at the 8th second.)

2. Troubleshooting Air Conditioner

Refrigeration cycle system

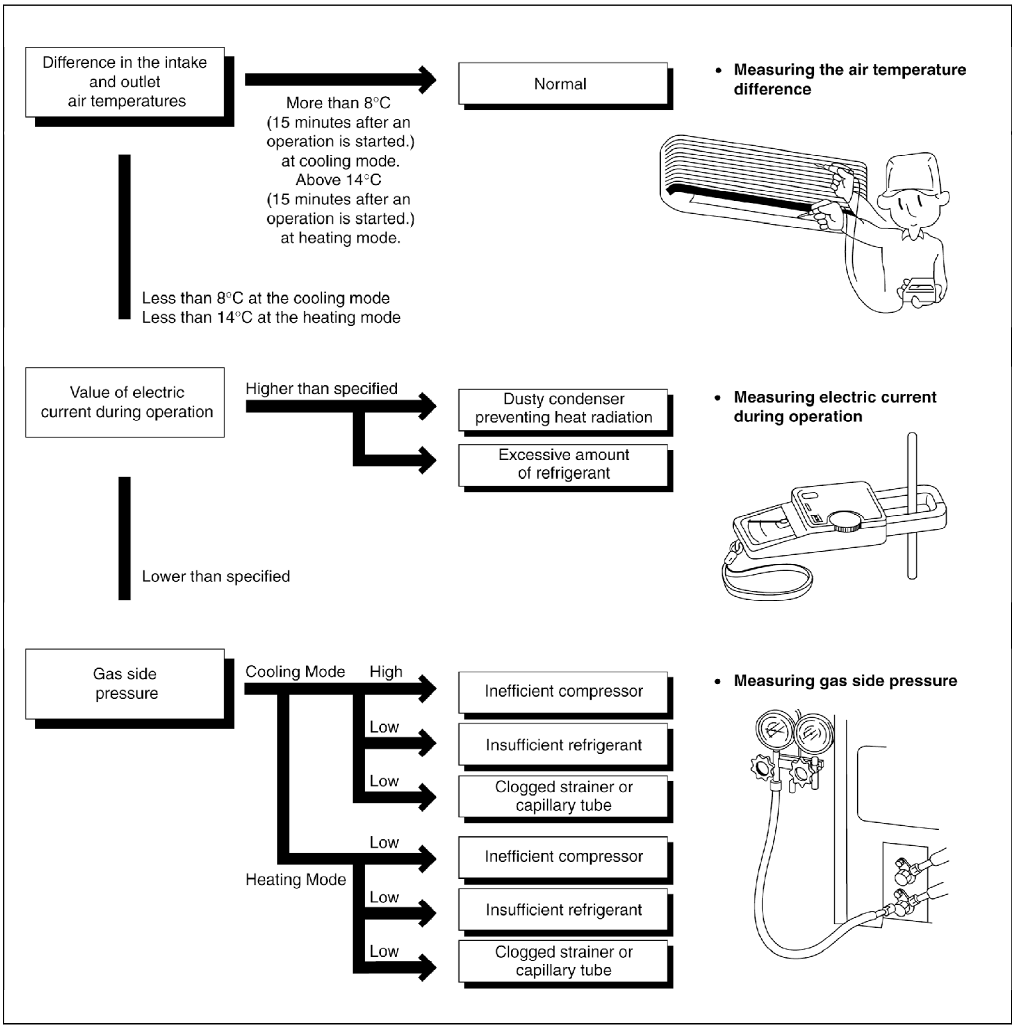
In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan.

The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table to the right.

Normal Pressure and Outlet Air Temperature (Standard)

	Gas pressure MPa (kg/cm²G)	Outlet air temperature (°C)
Cooling Mode	0.9 ~ 1.2 (9 ~ 12)	12 ~ 16
Heating Mode	2.3 ~ 2.9 (23 ~ 29)	36 ~ 45

★ Condition:
- Indoor fan speed; High
- Outdoor temperature 35°C at cooling mode and 7°C at heating mode.
- Compressor operates at rated frequency


Difference in the intake and outlet air temperatures
More than 8°C (15 minutes after an operation is started.) at cooling mode.
Above 14°C (15 minutes after an operation is started.) at heating mode.
Normal
Less than 8°C at the cooling mode
Less than 14°C at the heating mode
• Measuring the air temperature difference
Value of electric current during operation
Higher than specified
Dusty condenser preventing heat radiation
Excessive amount of refrigerant
Lower than specified
• Measuring electric current during operation
Gas side pressure
Cooling Mode
High
Inefficient compressor
Low
Insufficient refrigerant
Low
Clogged strainer or capillary tube
Low
Inefficient compressor
Heating Mode
Low
Insufficient refrigerant
Low
Clogged strainer or capillary tube
• Measuring gas side pressure

1. Relationship between the condition of the air conditioner and pressure and electric current

Condition of the air conditoner	Cooling Mode			Heating Mode		
	Low Pressure	High Pressure	Electric current during operation	Low Pressure	High Pressure	El cu du op
Insufficient refrigerant (gas leakage)	↘	↘	↘	↘	↘	
Clogged capillary tube or Strainer	↘	↘	↘	↗	↗	
Short circuit in the indoor unit	↘	↘	↘	↗	↗	
Heat radiation deficiency of the outdoor unit	↗	↗	↗	↘	↘	
Inefficient compression	↗	↘	↘	↗	↘	

- Carry on the measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

12.2. Breakdown Self Diagnosis Function

Once abnormality detected during operation, the unit will immediately stop its operation (Timer LED is blinking) and maximum of three error codes (abnormality) will be saved in memory. The abnormality of the operation can be identified through the below breakdown diagnosis method:

- Press “CHECK” button at remote controller continuously for more than five seconds to turn on the diagnosis mode, “H11” will be displayed at remote controller.

- By pressing the TMER “∧” button once, next error code will be displayed; press “V” button once, previous error code will be displayed.

- If error code displayed matches the error code saved in unit

memory (abnormality detected), four “beep” sounds will be heard and Power LED will light on. Otherwise, one “beep” sound is heard.

If “CHECK” button is press again or without any operation for 30 seconds, the diagnosis mode will turn off.

Error Codes Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgement	Emergency operation	Primary location t
H11	**Indoor / outdoor abnormal communication**	**> 1 min after starting operation**	**Indoor fan operation only**	**-Internal / external cable co** **-Indoor / Outdoor PCB**
H14	**Indoor intake air temperature sensor abnormality**	**—**	**—**	**-Intake air temperature sens or disconnected)**
H15	**Outdoor compressor temperature sensor abnormality**	**Continue for 5 sec.**	**—**	**-Compressor temperature s (defective or disconnected)**
H16	**Outdoor Current Transformer open circuit**	**—**	**—**	**-Outdoor PCB** **-IPM (Power transistor) mo**
H19	**Indoor fan motor merchanism lock**	**—**	**—**	**-Indoor PCB** **-Fan motor**
H23	**Indoor heat exchanger temperature sensor abnormality**	**Continue for 5 sec.**	**O (Cooling only)**	**-Heat exchanger temperatu (defective or disconnected)**
H27	**Outdoor air temperature sensor abnormality**	**Continue for 5 sec.**	**O**	**-Outdoor temperature sens or disconnected)**
H28	**Outdoor heat exchanger temperature sensor abnormality**	**Continue for 5 sec.**	**O**	**-Outdoor heat exchanger te sensor (defective or discon**
H33	**Indoor/Outdoor wrong connection**	**—**	**—**	**-Indoor/Outdoor supply vol**
H98	**Indoor high pressure protection**	**—**	**—**	**-Air filter dirty** **-Air circulation short circui**
H99	**Indoor heat exchanger anti-freezing protection**	**—**	**—**	**-Insufficient refrigerant** **-Air filter dirty**
F11	**Cooling / Heating cycle changeover abnormality**	**4 times occurance within 30 minutes**	**—**	**-4-way valve** **-V-coil**
F90	**PFC control**	**4 times occurance within 10 minutes**	**—**	**-Voltage at PFC**

F91	**Refrigeration cycle abnormality**	**2 times occurance within 20 minutes**	**—**	**-No refrigerant (3-way valve is closed)**
F95	**Cool high pressure protection**	**4 times occurance within 20 minutes**	**—**	**-Outdoor refrigerant circuit**
F96	**IPM (power transistor) overheating protection**	**—**	**—**	**-Excess refrigerant -Improper heat radiation -IPM (Power transistor)**
F97	**Outdoor compressor overheating protection**	**4 times occurance within 10 minutes**	**—**	**-Insufficient refrigerant -Compressor**
F98	**Total running current protection**	**3 times occurance within 20 minutes**	**—**	**-Excess refrigerant -Improper heat radiation**
F99	**Outdoor Direct Current (DC) peak detection**	**7 times occurance continuously**	**—**	**-Outdoor PCB -IPM (Power transistor) -Compressor**

The memory data of error code is erased when the power supply is cut off, or press the Auto Switch until “beep” sound heard following by pressing the “RESET” button at remote controller. Although operation forced to stop when abnormality detected, emergency operation is possible for certain errors (refer to Error Codes Table) by using remote controller or Auto Switch at indoor unit. However, the remote controller signal receiving sound is changed from one “beep” to four “beep” sounds.

12.3. Remote Control

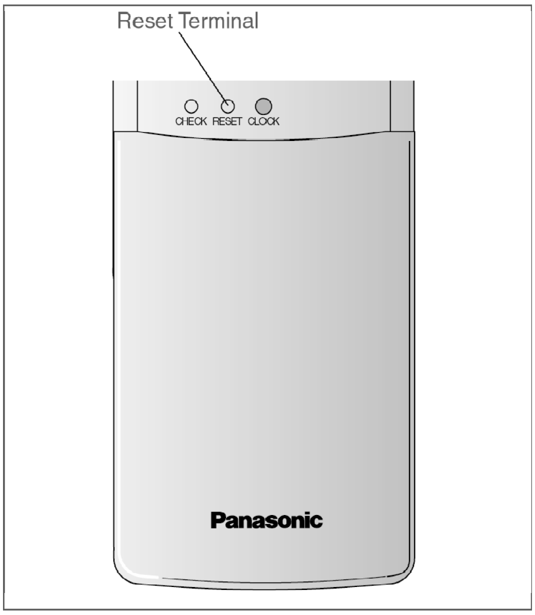
- Remote Control Reset

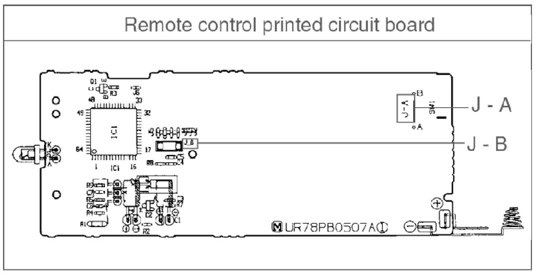
When the batteries are inserted for the first time, or the batteries are replaced, all the indications will blink and the remote control might not work.

If this happen, remove the cover of the remote control and push the reset point once to clear the memory data.

- Changing the wireless remote control transmission code

When there are more than one indoor units installed in the same room, it is possible to set different remote control receiving signal by modifying the jumpers inside remote controller.


Reset Terminal
CHECK
RESET
CLOCK
Panasonic


Remote control printed circuit board
J - A
J - B
UR78PB0507A

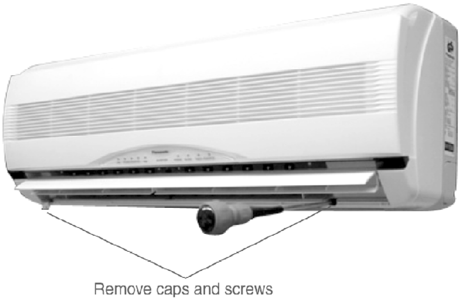
	Remote control printed circuit board		Note
	J - A	J - B	
0	SHORT	OPEN	At product delivery
1	OPEN	OPEN	
2	SHORT	SHORT	
3	OPEN	SHORT	

12.4. Disassembly of Parts

a. Indoor Control Board Removal Procedures

1. Remove the Front Grille

Fig. 1


Remove caps and screws

2. Remove the Indoor Control Board

Fig. 3

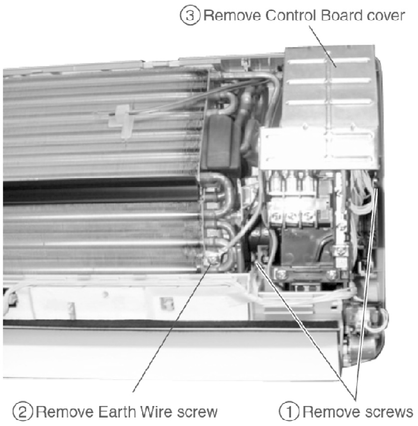

③ Remove Control Board cover
② Remove Earth Wire screw
① Remove screws

Fig. 5

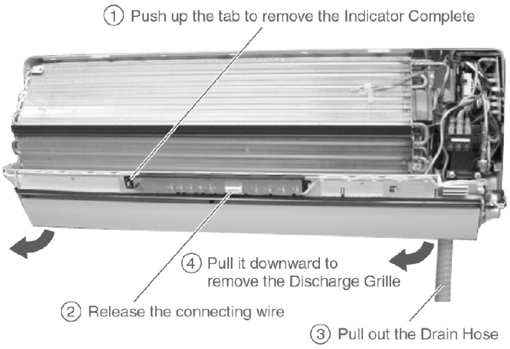

① Push up the tab to remove the Indicator Complete
④ Pull it downward to remove the Discharge Grille
② Release the connecting wire
③ Pull out the Drain Hose

Fig. 2

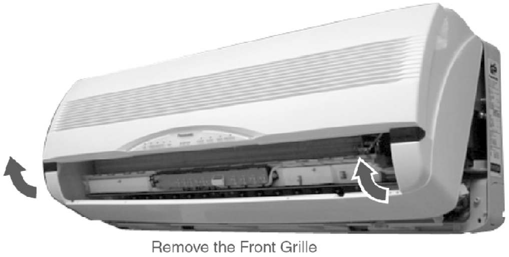

Remove the Front Grille

Fig. 4

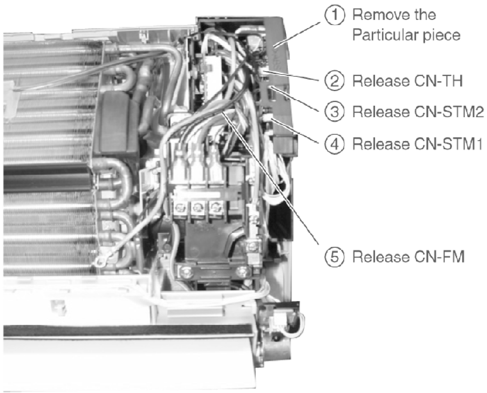
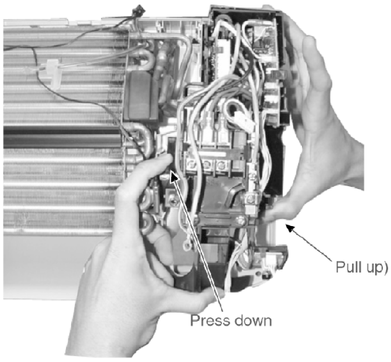

① Remove the Particular piece
② Release CN-TH
③ Release CN-STM2
④ Release CN-STM1
⑤ Release CN-FM

Fig. 6


Pull up)
Press down

b. Electronic Controller Removal Procedures

1. Remove Main Electronic Controller

Fig. 7

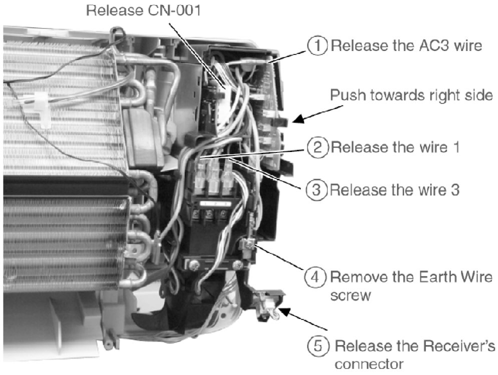

Release CN-001
①Release the AC3 wire
Push towards right side
②Release the wire 1
③Release the wire 3
④Remove the Earth Wire screw
⑤ Release the Receiver's connector

Fig. 8

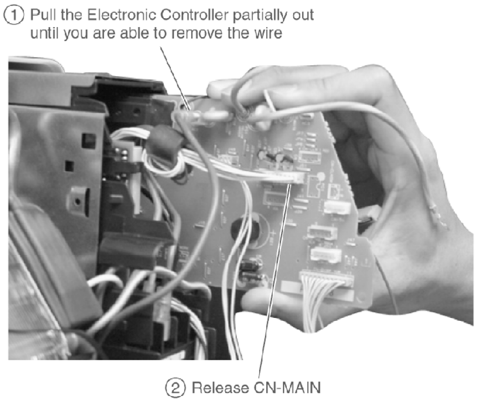
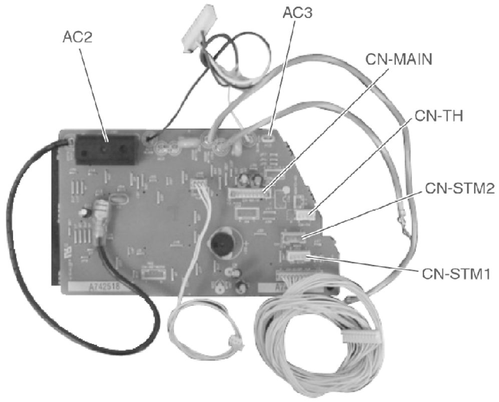

① Pull the Electronic Controller partially out until you are able to remove the wire
② Release CN-MAIN

Fig. 9


AC2
AC3
CN-MAIN
CN-TH
CN-STM2
CN-STM1

2. Remove Power Electronic Controller

Fig. 10

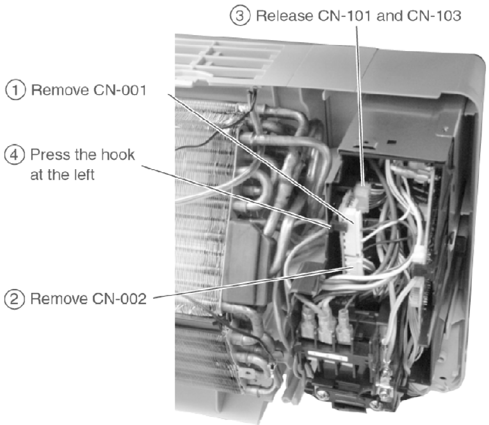
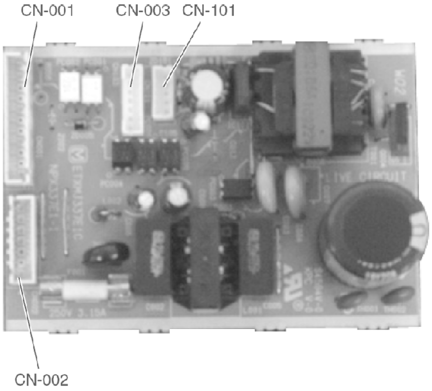

③ Release CN-101 and CN-103
① Remove CN-001
④ Press the hook at the left
② Remove CN-002

Fig. 11


CN-001
CN-003
CN-101
CN-002

c. Cross Flow Fan and Fan Motor Removal Procedures

1. Remove Cross Flow Fan

Fig. 12

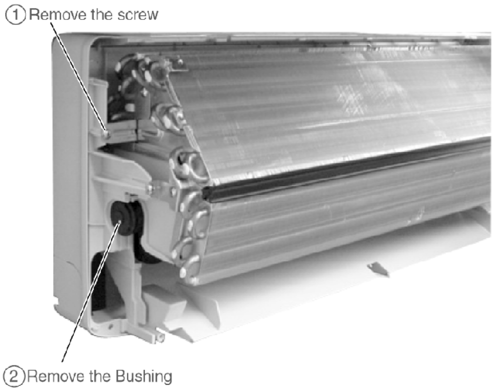

① Remove the screw
② Remove the Bushing

Fig. 14

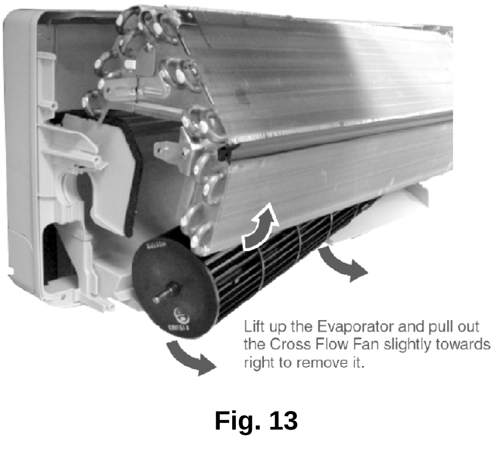
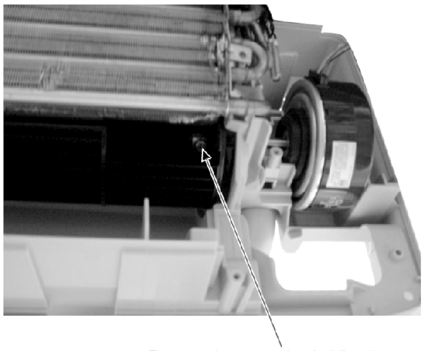
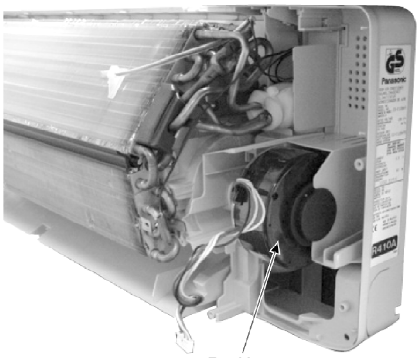

Lift up the Evaporator and pull out the Cross Flow Fan slightly towards right to remove it.

Fig. 13


Remove the screw that holding the
Fan Motor and Cross Flow Fan

2. Remove the Fan Motor

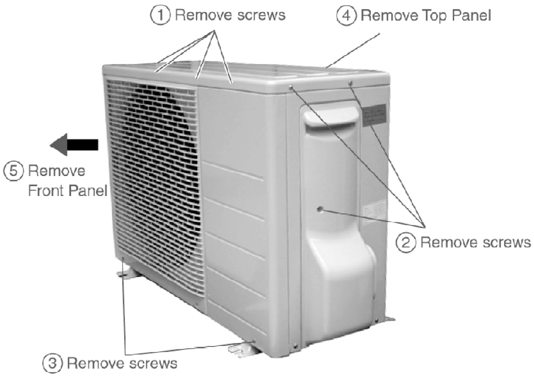
Fig. 15



c. Outdoor Electronic Controller Removal Procedure

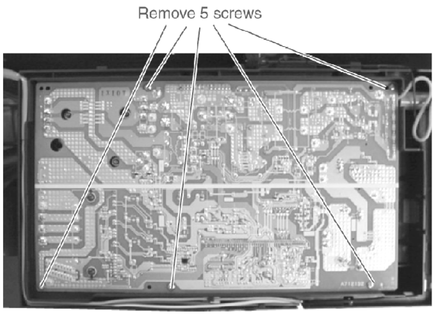
1. Remove the top panel and front panel

Fig. 16


① Remove screws
④ Remove Top Panel
⑤ Remove
Front Panel
② Remove screws
③ Remove screws

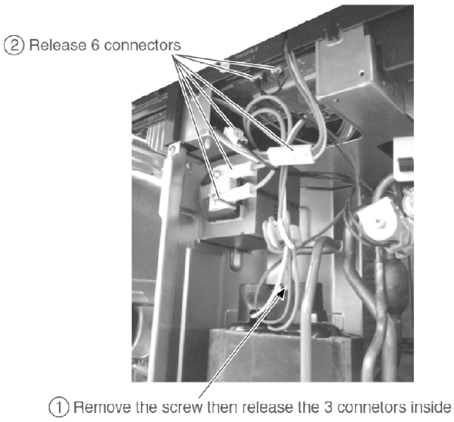
2. Remove the Outdoor Electronic Controller

Fig. 18


Remove 5 screws

Caution! When handling electronic controller, be careful of electrostatic discharge.

Fig. 19


② Release 6 connectors
① Remove the screw then release the 3 connetors inside

WARNING

-Be save to return the wiring to its original position

-There are many high voltage components within the heat sink cover so never touch the interior during operation. Wait at least two minutes after power has been turned off.

Fig. 17

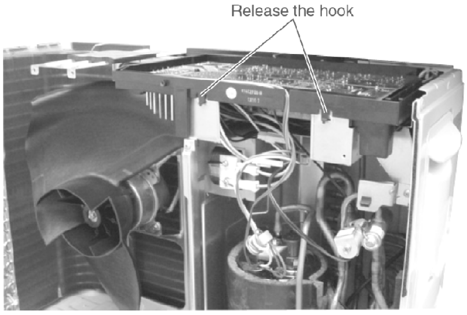
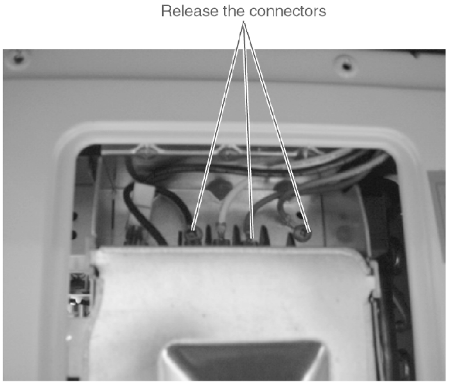

Release the hook

Fig.20

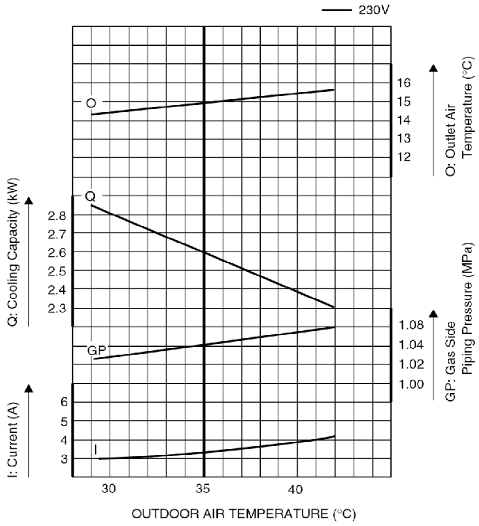

Release the connectors

13. Technical Data

■ Operation characteristics

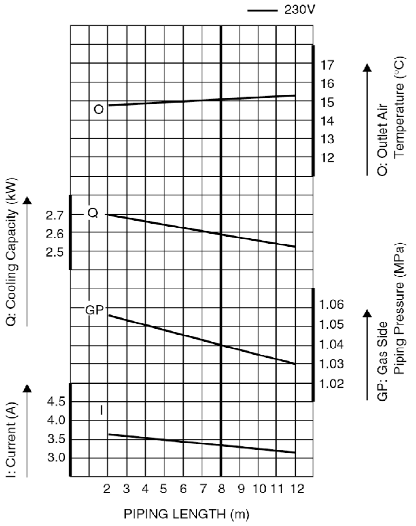
CS-E9BKP / CU-E9BKP5

- **Cooling Characteristic**



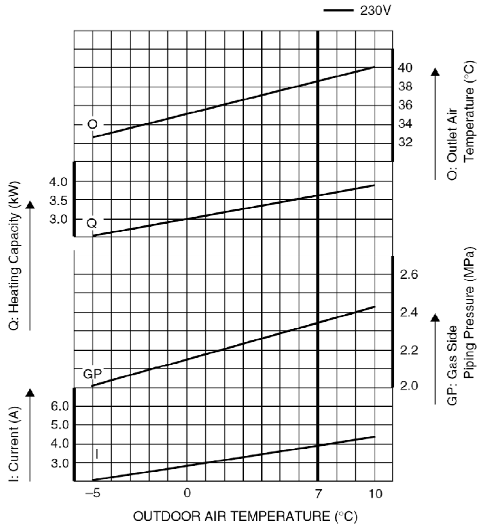
[Condition] Room temperature: 27/19°C
Cooling Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Piping Length Characteristic (Cooling)**



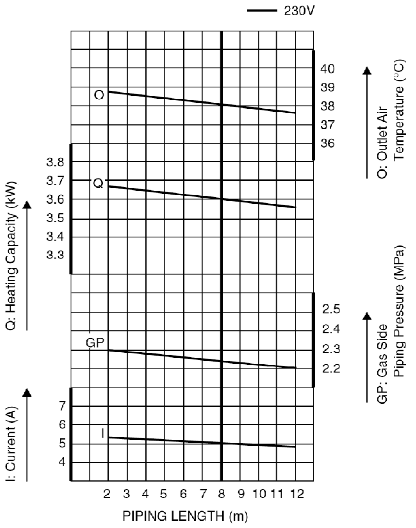
[Condition] Room temperature: 27/19°C
Cooling Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Heating Characteristic**



[Condition] Room temperature: 20°C
Heating Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Piping Length Characteristic (Heating)**

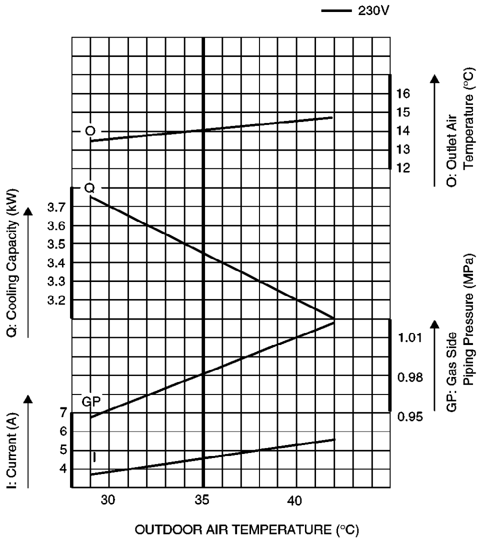


[Condition] Room temperature: 20°C
Heating Operation: 7/6°C
Piping length: at High Fan
Rated Frequency Operation

■ Operation characteristics

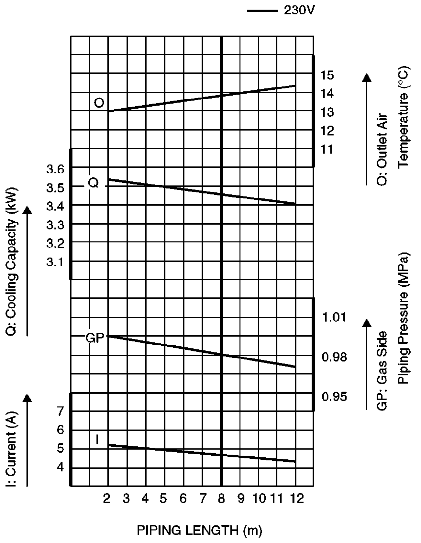
CS-E12BKP / CU-E12BKP5

- **Cooling Characteristic**



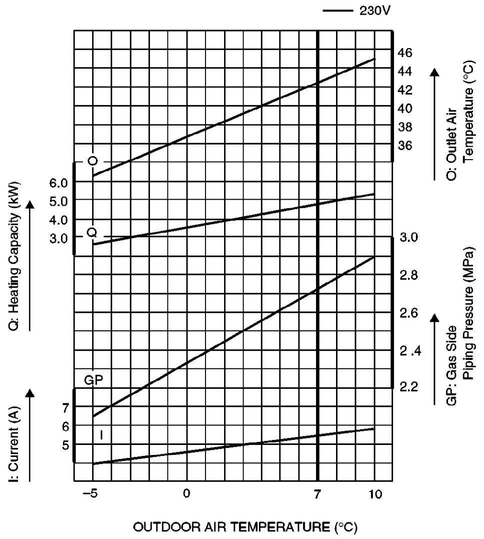
[Condition] Room temperature: 27/19°C
Cooling Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Piping Length Characteristic (Cooling)**



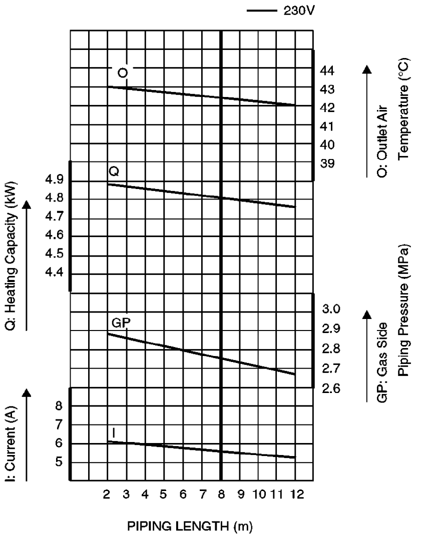
[Condition] Room temperature: 27/19°C
Cooling Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Heating Characteristic**



[Condition] Room temperature: 20°C
Heating Operation: at High Fan
Piping length: 5m
Rated Frequency Operation

- **Piping Length Characteristic (Heating)**



[Condition] Room temperature: 20°C
Heating Operation: 7/6°C
Piping length: at High Fan
Rated Frequency Operation

■ Sensible Capacity Chart

- **CS-E9BKP / CU-E9BKP5**

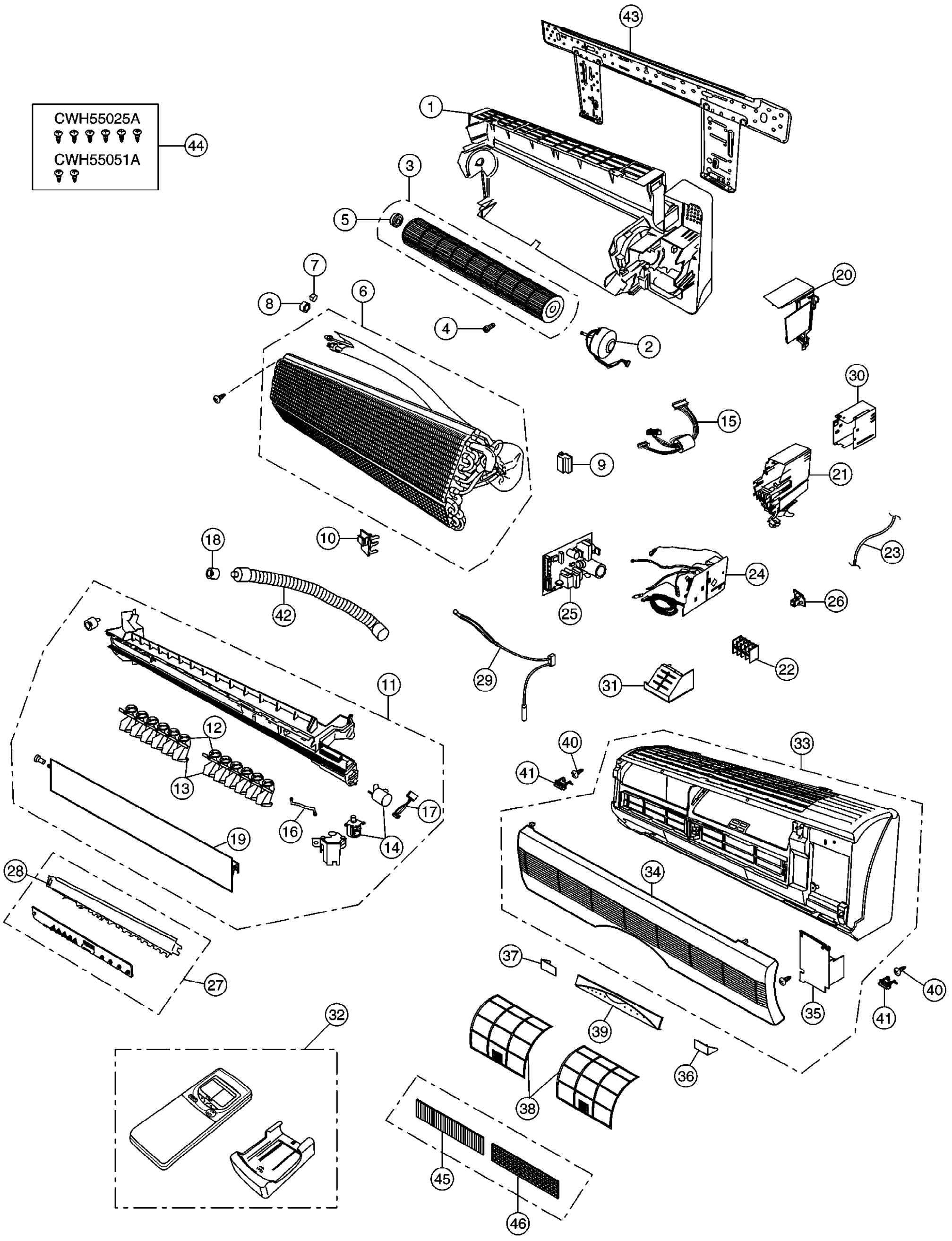
230V	Outdoor Temp. (°C)											
Indoor wet bulb temp.	30			35			40			46		
	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
17.0°C	2.58	1.96	0.64	2.41	1.88	0.69	2.24	1.80	0.74	2.04	1.71	0.80
19.0°C				2.60		0.70						
19.5°C	2.83	2.05	0.65	2.65	1.97	0.70	2.46	1.89	0.75	2.24	1.80	0.81
22.0°C	3.09	2.12	0.67	2.88	2.04	0.72	2.68	1.97	0.77	2.44	1.88	0.83

- **CS-E12BKP / CU-E12BKP5**

230V	Outdoor Temp. (°C)											
Indoor wet bulb temp.	30			35			40			46		
	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP	TC	SHC	IP
17.0°C	3.42	2.59	0.87	3.20	2.49	0.94	2.97	2.39	1.00	2.70	2.27	1.08
19.0°C				3.45		0.95						
19.5°C	3.76	2.72	0.89	3.51	2.61	0.95	3.27	2.51	1.02	2.97	2.39	1.10
22.0°C	4.10	2.82	0.90	3.83	2.71	0.97	3.56	2.61	1.04	3.24	2.49	1.12

14. Exploded View

CS-E9BKP / CS-E12BKP


43
CWH55025A
CWH55051A
44
1
3
5
7
8
6
4
2
20
30
15
9
21
18
10
23
42
24
26
25
22
11
29
31
12
40
33
41
13
17
19
16
14
34
28
27
37
35
40
41
32
39
36
38
45
46

Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

15. Replacement Parts List

<Model: CS-E9BKP / CS-E12BKP>

REF NO.	DESCRIPTION & NAME	QTY.	CS-E9BKP	CS-E12BKP	REMARKS
1	CHASSY COMPLETE	1	CWD50C1177	←	
2	FAN MOTOR	1	CWA981056	←	O
3	CROSS-FLOW FAN COMPLETE	1	CWH02C1012	←	
4	SCREW - CROSS-FLOW FAN	1	CWH4580304	←	
5	BEARING ASSY	1	CWH64K007	←	
6	EVAPORATOR	1	CWB30C1149	CWB30C1154	
7	FLARE NUT (1/4)	1	CWH6002140	←	
8	FLARE NUT	1	CWT25005 (3/8)	CWT25007 (1/2)	
9	ANTI-VIBRATION BUSHING	1	CWH501027	←	
10	INTAKE AIR SENSOR HOLDER	1	CWH32142	←	
11	DISCHARGE GRILLE COMPLETE	1	CWE20C2120	←	
12	VANE	12	CWE241088	←	
13	CONNECTING BAR	2	CWE261035	←	
14	AIR SWING MOTOR	1	CWA98259	←	O
15	LEADWIRE	1	CWA67C3849	←	
16	FULCRUM	1	CWH621013	←	
17	LEADWIRE - AIR SWING MOTOR	1	CWA67C3977	←	
18	CAP COMPLETE	1	CWH52C1001	←	
19	VANE	1	CWE241070	←	
20	PARTICULAR PIECE	1	CWD932162	←	
21	CONTROL BOARD	1	CWH102103	←	
22	TERMINAL BOARD COMPLETE	1	CWA28C2082	←	O
23	POWER SUPPLY CORD	1	CWA20C2207	CWA20C2238	
24	ELECTRONIC CONTROLLER-MAIN	1	CWA742518	←	O
25	ELECTRONIC CONTROLLER -P.SUPPLY	1	CWA742616	←	O
26	PCB RECEIVER	1	CWA73C1124	←	
27	INDICATOR COMPLETE	1	CWE39C1049	-	
28	INDICATOR HOLDER	1	CWD932163	-	
29	SENSOR COMPLETE	1	CWA50C608	←	O
30	CONTROL BOARD COVER (TOP)	1	CWH131091	←	
31	CONTROL BOARD COVER (FRONT)	1	CWH131090	←	
32	REMOTE CONTROL COMPLETE	1	CWA75C2154	←	O
33	FRONT GRILLE COMPLETE	1	CWE11C2329	←	
34	INTAKE GRILLE	1	CWE221036	←	
35	GRILLE DOOR	1	CWE141033	←	
36	DECORATION BASE (RIGHT)	1	CWE351067	←	
37	DECORATION BASE (LEFT)	1	CWE351068	←	
38	AIR FILTER	2	CWD001047	←	
39	CONTROL PANEL	1	CWE312143	←	
40	SCREW FOR FRONT GRILLE	2	XTN4+16C	←	
41	CAP FOR FRONT GRILLE	2	CWH521062	←	
42	DRAIN HOSE	1	CWH85287	←	
43	INSTALLING HOLDER ASSY	1	CWH36K1006	←	
44	BAG COMPLETE FOR INSTALLATION	1	CWH82C067	←	
45	AIR PURIFYING FILTER	1	CWMD00C0001	←	O

REF NO.	DESCRIPTION & NAME	QTY.	CS-E9BKP	CS-E12BKP	REMARKS
46	SOLAR DEODORIZING FILTER	1	CWMD00C0002	←	O

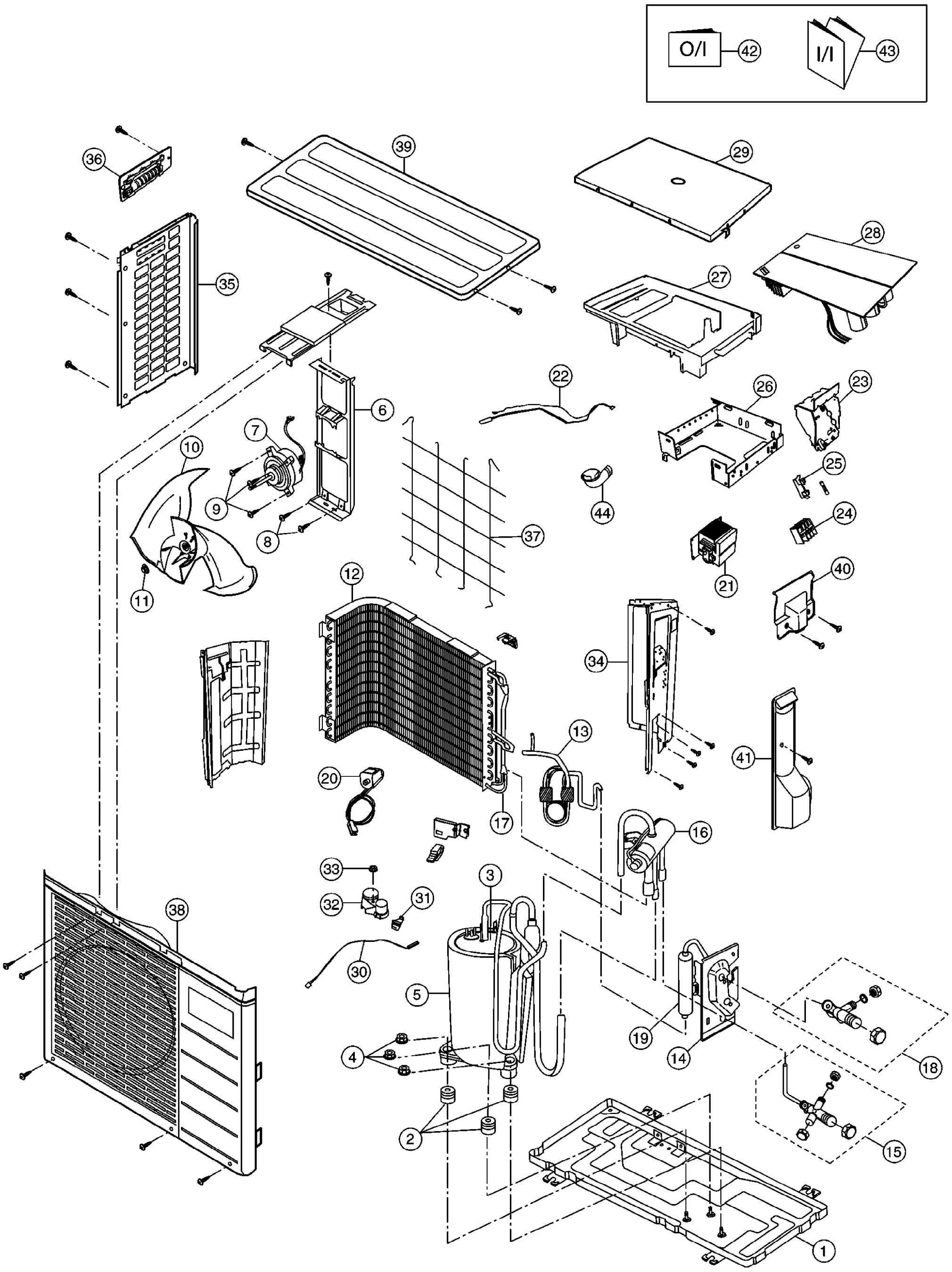
(Note)

- All parts are supplied from MACC, Malaysia (Vendor Code: 086).

- “O” marked parts are recommended to be kept in stock.

16. Exploded View

CU-E9BKP5 / CU-E12BKP5


O/I
42
I/I
43
36
39
29
28
35
27
6
7
10
9
8
11
22
26
23
25
44
24
37
21
12
40
34
41
13
20
17
16
3
33
32
31
38
30
5
19
14
18
4
2
15
1

Note:
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

17. Replacement Parts List

<Model: CU-E9BKP5 / CU-E12BKP5>

REF NO.	DESCRIPTION & NAME	QTY.	CU-E9BKP5	CU-E12BKP5	REMARKS
1	CHASSY ASSY	1	CWD50K2045A	←	
2	ANTI-VIBRATION BUSHING	3	CWH50077	←	
3	COMPRESSOR	1	5CS102XEA	←	O
4	NUT-COMPRESSOR MOUNT	3	CWH56000	←	
5	SOUND PROOF MATERIAL	1	CWG302111	-	
6	FAN MOTOR BRACKET	1	CWD541030	←	
7	FAN MOTOR	1	CWA951125	CWA951126	O
8	SCREW - FAN MOTOR BRACKET	2	CWH551060	←	
9	SCREW - FAN MOTOR MOUNT	4	CWH55406	←	
10	PROPELLER FAN ASSY	1	CWH03K1006	←	
11	NUT - PROPELLER FAN	1	CWH56053	←	
12	CONDENSER	1	CWB32C1145	CWB32C1146	
13	TUBE ASS'Y CO (CAP./CHK VALVE)	1	CWT01C2360	CWT01C2361	
14	HOLDER-COUPLING COMPLETE	1	CWT01C2420	CWT01C2421	O
15	3 WAYS VALVE	1	CWB011074	CWB011075	O
16	4 WAYS VALVE	1	CWB001011	←	
17	STRAINER	1	CWMB110002	←	
18	2 WAYS VALVE	1	CWB021065	←	O
19	DRYER	1	CWB101009	←	
20	V-COIL COMPLETE	1	CWA43C2072	←	
21	REACTOR	1	CWA421050	CWA421051	
22	SENSOR COMPLETE	1	CWA50C2084	←	
23	CONTROL BOARD	1	CWH102122	←	
24	TERMINAL BOARD ASSY	1	CWA28K224	←	
25	FUSE HOLDERS	1	K3GB1PH00016	←	
26	CONTROL BOARD	1	CWH102114	←	
27	CONTROL BOARD	1	CWH102115	←	
28	ELECTRONIC CONTROLLER	1	CWA742656	CWA742657	
29	CONTROL BOARD COVER	1	CWH131104	←	
30	SENSOR COMPLETE	1	CWA50C2066	←	
31	HOLDER SENSOR	1	CWH321010	←	
32	TERMINAL COVER	1	CWH171001	←	
33	NUT-TERMINAL COVER	1	CWH7080300	←	
34	CABINET SIDE PLATE CO.	1	CWE04C1011	←	
35	CABINET SIDE PLATE (LEFT)	1	CWE041031A	←	
36	HANDLE	1	CWE161010	←	
37	WIRE NET	1	CWD041026	CWD041027	

REF NO.	DESCRIPTION & NAME	QTY.	CU-E9BKP5	CU-E12BKP5	REMARKS
38	CABINET FRONT PLATE CO.	1	CWE06C1039	←	
39	CABINET TOP PLATE	1	CWE031014A	←	
40	CONTROL BOARD COVER	1	CWH131110	←	
41	CONTROL BOARD COVER	1	CWH131093	←	
42	OPERATING INSTRUCTION	1	CWF563352	←	
43	INSTALLATION INSTRUCTION	1	CWF612207	←	
44	L-TUBE	1	CWH5850080	←	

(Note)

- All parts are supplied from MACC, Malaysia (Vendor Code: 086).

- “O” marked parts are recommended to be kept in stock.

18. Electronic Circuit Diagram

CS-E9BKP / CS-E12BKP

Fig. 1

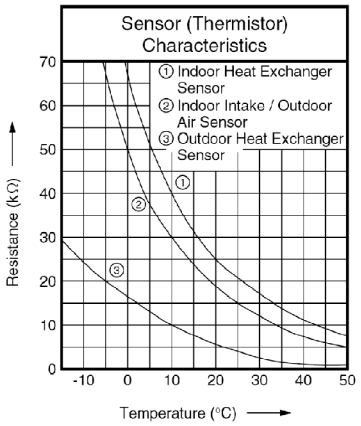
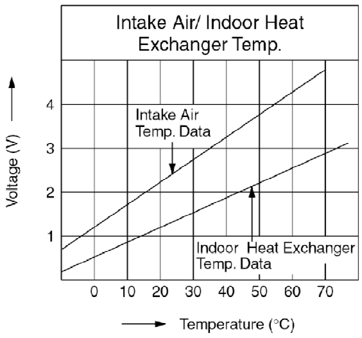


Fig. 2



CU-E9BKP5 / CU-E12BKP5

Fig. 3

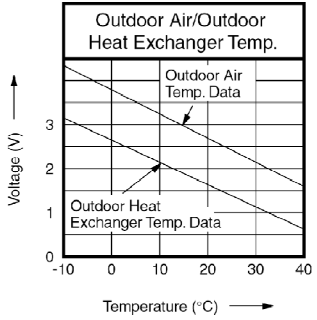


Fig. 4

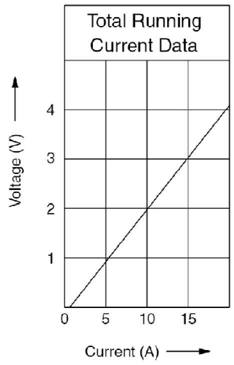


Fig. 5

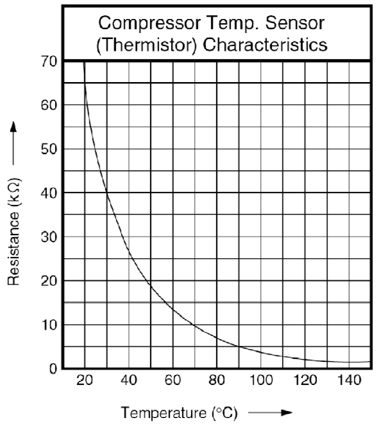
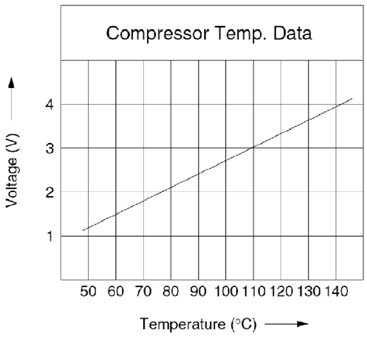


Fig. 6



How to use electronic circuit diagram

Before using the circuit diagram, read the following carefully.

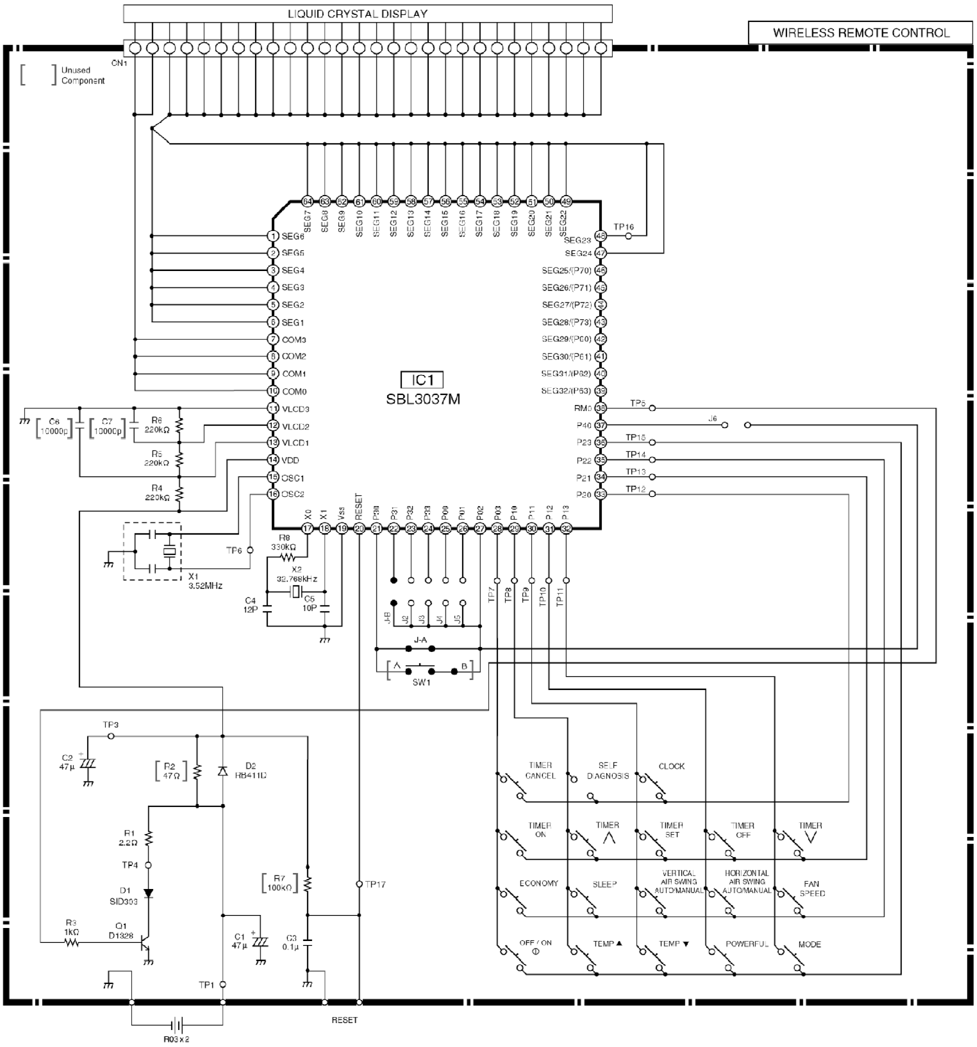
* Voltage measurement
Voltage has been measured with a digital tester when the indoor fan is set at high fan speed under the following conditions without setting the timer.
Use them for servicing.
Voltage indication is in Red at all operations.

* Indications for resistance
a. K....kΩ M....MΩ
W...watt Not indicated....1/4W
b. Type
Not indicated..........carbon resister
Tolerance±5%
..........metal oxide resister
Tolerance±1%

* Indications for capacitor
a. Unit μ....μF P....pF
b. Type Not indicated....ceramic capacitor
(S)...........S series aluminium electrolytic capacitor
(Z)...........Z series aluminium electrolytic capacitor
(SU)........SU series aluminium electrolytic capacitor
(P)...........P series polyester system
(SXE)......SXE series aluminium electrolytic capacitor
(SRA)......SRA series aluminium electrolytic capacitor
(KME)......KME series aluminium electrolytic capacitor

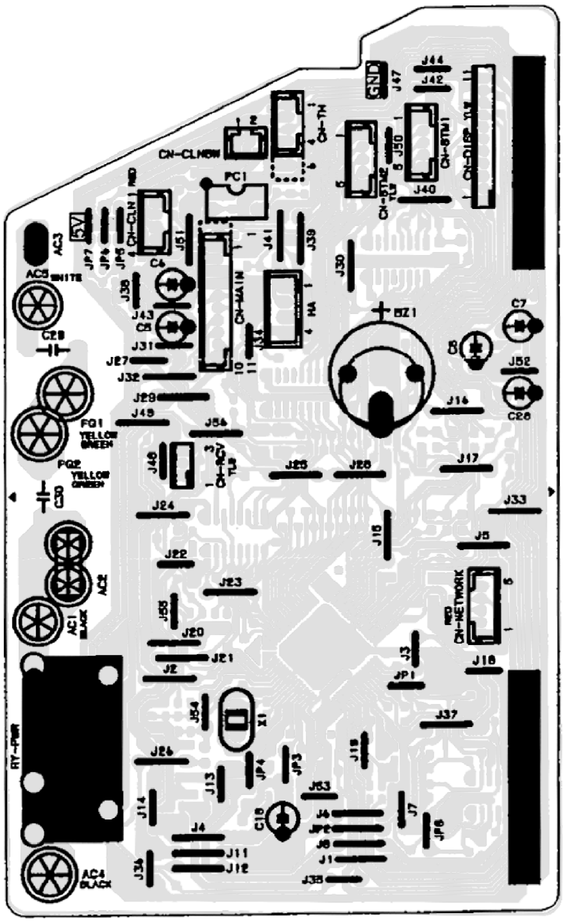
* Diode without indication.............MA165
※ Circuit Diagram is subject to change without notice for further development.

18.1. REMOTE CONTROL

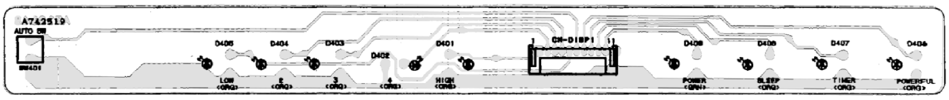

LIQUID CRYSTAL DISPLAY
WIRELESS REMOTE CONTROL
CN1
[ ] Unused Component
IC1
SBL3037M
SEG6
SEG5
SEG4
SEG3
SEG2
SEG1
COM3
COM2
COM1
COM0
VLCD3
VLCD2
VLCD1
VDD
OSC1
OSC2
SEG7
SEG8
SEG9
SEG10
SEG11
SEG12
SEG13
SEG14
SEG15
SEG16
SEG17
SEG18
SEG19
SEG20
SEG21
SEG22
SEG23
SEG24
SEG25/(P70)
SEG26/(P71)
SEG27/(P72)
SEG28/(P73)
SEG29/(P60)
SEG30/(P61)
SEG31/(P62)
SEG32/(P63)
RM0
P40
P23
P22
P21
P20
X0
X1
Vss
RESET
P30
P31
P32
P33
P00
P01
P02
P03
P10
P11
P12
P13
TP16
TP5
J6
TP15
TP14
TP13
TP12
C6 10000p
C7 10000p
R6 220kΩ
R5 220kΩ
R4 220kΩ
TP6
X1 3.52MHz
R8 330kΩ
X2 32.768kHz
C4 12P
C5 10P
J-B
J2
J3
J4
J5
J-A
A
B
SW1
TP7
TP8
TP9
TP10
TP11
TP3
C2 47μ
R2 47Ω
D2 RB411D
R1 2.2Ω
TP4
D1 SID303
R3 1kΩ
Q1 D1328
R7 100kΩ
TP17
C1 47μ
C3 0.1μ
TP1
RESET
R03 x 2
TIMER CANCEL
SELF DIAGNOSIS
CLOCK
TIMER ON
TIMER ⋀
TIMER SET
TIMER OFF
TIMER ⋁
ECONOMY
SLEEP
VERTICAL AIR SWING AUTO/MANUAL
HORIZONTAL AIR SWING AUTO/MANUAL
FAN SPEED
OFF / ON ⏻
TEMP ▲
TEMP ▼
POWERFUL
MODE

18.2. PRINT PATTERN / INDOOR UNIT PRINTED CIRCUIT BOARD

● **MAIN**

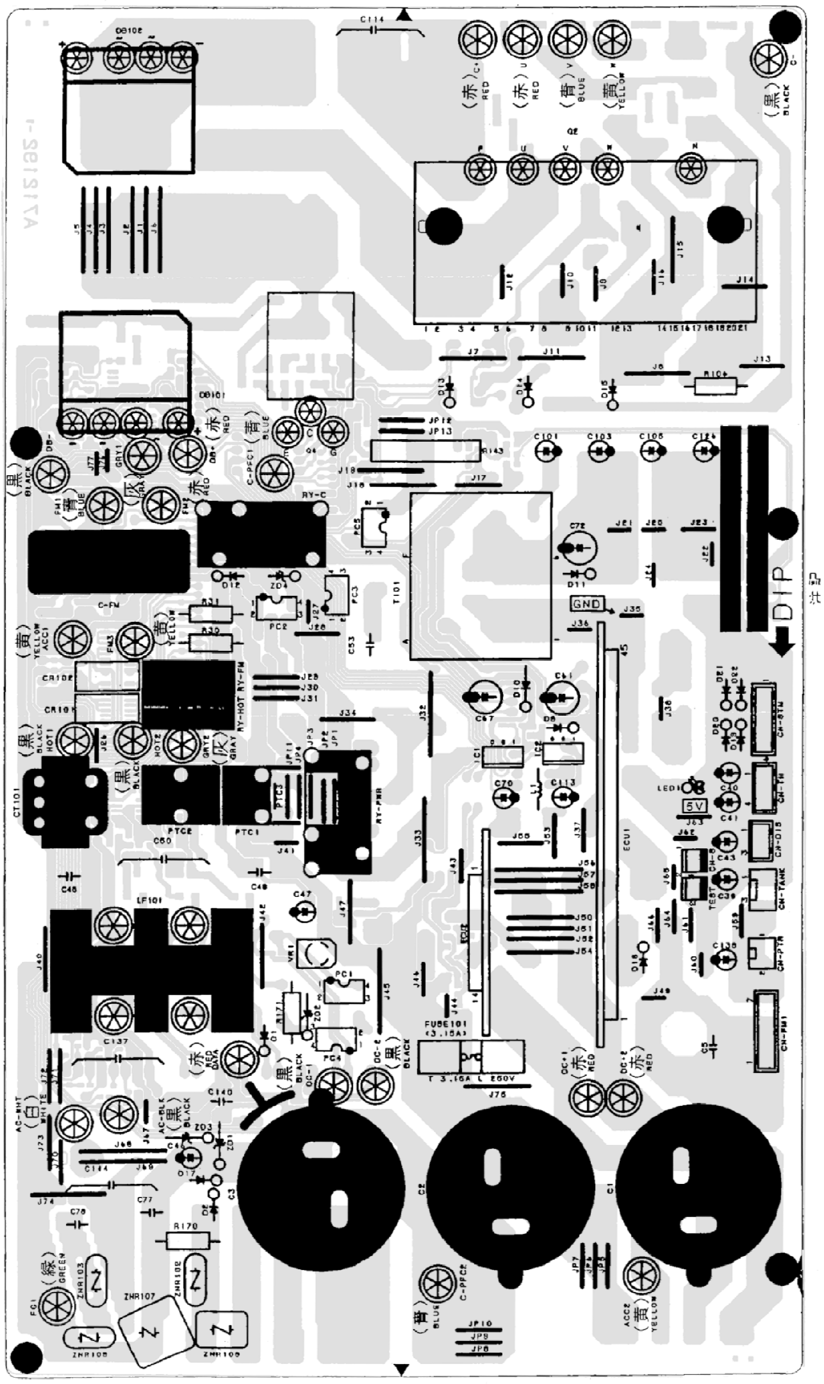

GND
J47
J44
J42
CN-TH
CN-STM1
CN-DISP
J50
CN-STM2
J40
CN-CLNSW
PC1
CN-CLN1
5V
AC3
JP7
JP6
JP5
C6
J51
J41
J39
J30
AC5
WHITE
J38
J43
C5
CN-MAIN
HA
BZ1
C7
C9
C29
J31
J27
J32
J33
J52
J29
J49
J54
J14
C28
FG1
YELLOW
GREEN
FG2
YELLOW
GREEN
J48
CN-RCV
J25
J28
J17
C30
J24
J15
J33
J5
J22
J23
AC2
CN-NETWORK
RED
J55
AC1
BLACK
J20
J21
J3
J18
J2
JP1
J54
X1
J37
RY-PWR
J26
JP4
JP3
J19
J13
J53
J14
C18
J4
JP2
J6
J1
J7
JP8
J11
J12
J34
J35
AC4
BLACK

● **INDICATOR**


A742519
AUTO SW
SW401
D405
D404
D403
D402
D401
CN-DISP1
1
11
D409
D408
D407
D406
LOW
<ORG>
2
<ORG>
3
<ORG>
4
<ORG>
HIGH
<ORG>
POWER
<GRN>
SLEEP
<ORG>
TIMER
<ORG>
POWERFUL
<ORG>

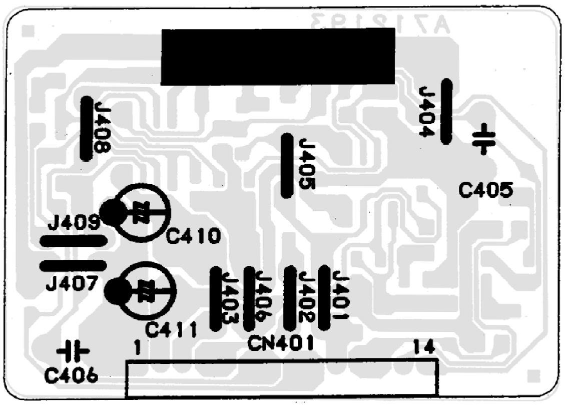
18.3. PRINT PATTERN / OUTDOOR UNIT PRINTED CIRCUIT BOARD VIEW

● MAIN



C114
DB102
(赤) C+ RED
(赤) U RED
(青) V BLUE
(黄) W YELLOW
(黒) C- BLACK
Q2
P
U
V
W
N
J5
J4
J3
J2
J1
J6
J12
J10
J9
J16
J15
J14
J7
J11
J8
J13
R104
D13
D14
D15
DB101
(赤) RED
(青) BLUE
C-PFC1
JP12
JP13
R143
C101
C103
C105
C124
J19
J18
J17
RY-C
PC5
T101
C72
D11
J21
J20
J23
J22
J24
GND
J35
J36
DIP
D12
ZD4
PC3
PC2
J27
J28
C53
C-FM
R31
R30
(黄) YELLOW ACC1
FM1
(黄) YELLOW
CR102
CR101
J29
J30
J31
RY-HOT
RY-FM
J34
J32
C67
D10
C61
D9
D21
D22
D20
D23
J38
CN-STM
(黒) BLACK HOT1
J26
HOT2
GRY2
(灰) GRAY
JP3
JP2
JP1
JP11
JP4
IC1
IC2
CT101
(黒) BLACK
PTC2
PTC1
RY-PWR
C70
C113
LED1
C40
5V
C41
CN-TH
J63
J62
CN-D15
C43
C60
J41
J33
J55
J53
J37
ECU1
J56
J57
J58
CN-S
TEST
C39
CN-TANK
C45
C46
C47
J47
J43
J65
LF101
J42
IC5
J50
J51
J52
J54
J66
J64
J61
J59
CN-PTR
J40
VR1
PC1
D16
J60
C135
J45
J46
J44
J49
CN-PM1
C5
R171
ZD2
PC4
FUSE101 (3.15A)
T 3.15A L 250V
(赤) RED DATA
(黒) BLACK DC-1
DC-2 (黒) BLACK
DC+1 (赤) RED
DC-2 (赤) RED
J75
C137
J72
AC-WHT (白) WHITE
J73
J70
AC-BLK (黒) BLACK
J67
C140
ZD3
ZD1
C144
J68
J69
C4
D17
C2
C3
C1
J74
C76
C77
R170
(緑) GREEN
ZNR103
ZNR102
ZNR107
ZNR105
ZNR106
FG1
(青) BLUE C-PFC2
JP7
JP6
JP5
ACC2 (黄) YELLOW
JP10
JP9
JP8

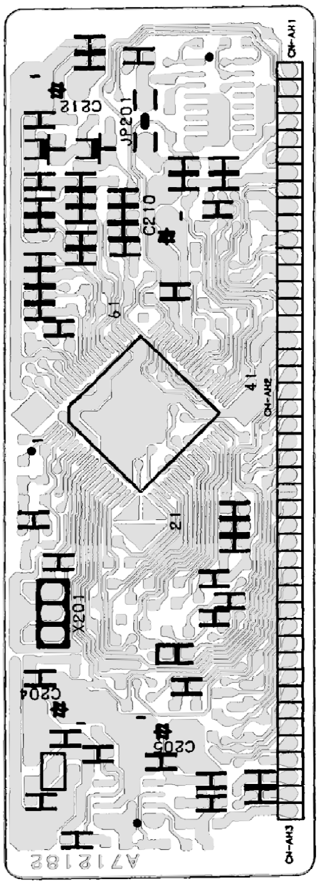
- **PFC**


J408
J404
J405
C405
J409
C410
J407
J403
J406
J402
J401
C411
CN401
1
14
C406

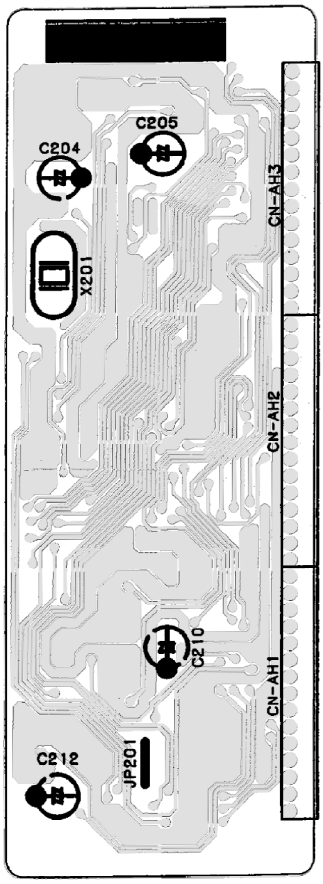
[redacted]

- **CPU**

TOP VIEW


CN-AH1
C212
JP201
C210
CN-AH2
X201
C204
C205
CN-AH3
A712182

BOTTOM VIEW


C205
C204
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X201
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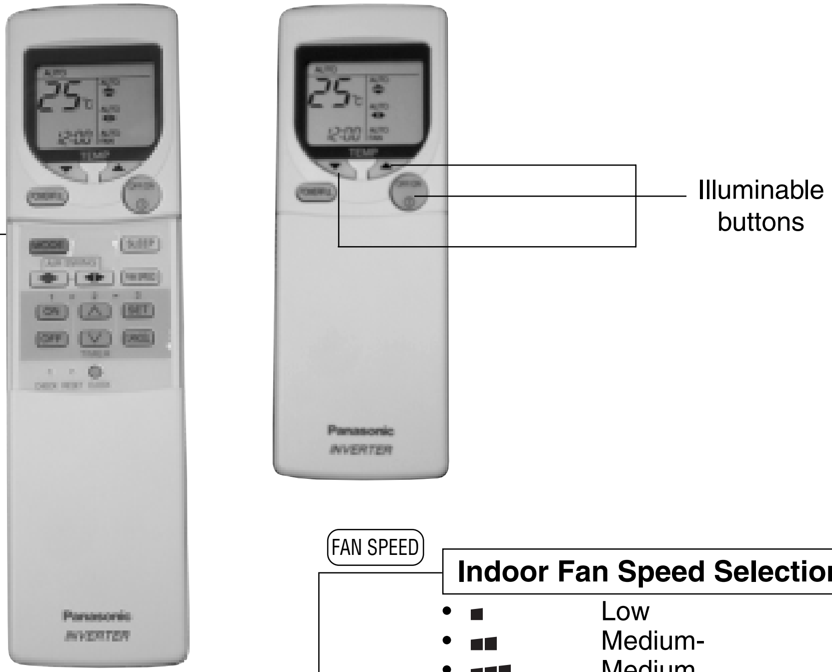
[MACC] Printed in Malaysia /

Remote Control



OFF/ON
⏻

Operation OFF / ON

MODE

Operation Mode Selection

AUTO	Automatic Operation
HEAT	Heating Operation
COOL	Cooling Operation
DRY	Soft Dry Operation
FAN	Fan Operation

POWERFUL

Powerful Mode Operation

SLEEP

Sleep Mode Operation OFF / ON

AIR SWING
◀▶ ⬍

Airflow Direction Control

⬍	Vertical Automatic Airflow Direction Control and Manual Airflow Direction Control (5 stages of adjustment).
◀▶	Horizontal Automatic Airflow Direction Control and Manual Airflow Direction Control (5 stages of adjustment).

FAN SPEED

Indoor Fan Speed Selection

■	Low
■■	Medium-
■■■	Medium
■■■■	Medium+
■■■■■	High
AUTO FAN	Automatic Fan Speed

TEMP
▼ ▲

Room Temperature Setting

- Temperature Setting (16°C to 30°C)

TIMER
ON OFF

Timer Operation Selection

- 24-hour, OFF / ON Real Timer Setting.

∧
∨

Time / Timer Setting

- Hours and minutes setting.

SET
CANCEL

Timer Operation Set / Cancel

- ON Timer and OFF Timer setting and cancellation.

○
CLOCK

Clock Setting

- Current time setting.

○
CHECK

Check Point

- Breakdown self diagnosis function.

○
RESET

Reset Point

- Clear memory data.

Indoor Unit

Automatic Operation Switch

- Press for < 5s to run Automatic Operation. (Used when the remote control cannot be used.)
- Press continuously for 5s and < 8s to run Forced Cooling Operation.
- Press continuously for 8s and < 11s to run Forced Heating Operation.
- Press continuously for 11s and < 16s to change different remote controlling setting (A↔B Mode).
- Press continuously for 16s or < 21s to switch OFF / ON Remote Control Receiving Sound or H14 Abnormality Detection Mode.

Operation Indication Lamps (LED)

- POWER MONITOR (Orange) ..... Lights up during compressor operation.
- POWER (Green) .... Lights up in operation, blinks in Automatic Operation Mode judging and Hot Start operation.
- TIMER (Orange) .... Lights up in Timer Setting. Blinks in Self Diagnosis Control.
- SLEEP (Orange)........ Lights up in Sleep Mode Operation.
- POWERFUL (Orange) .. Lights up when Powerful Mode is selected.

Five Operation Modes

- Automatic, Heating, Cooling, Soft Dry and Fan Operation.

Automatic and 5 Manual Indoor Fan Speeds

Automatic and 5 Manual Vertical Airflow Directions

Automatic and 5 Manual Horizontal Airflow Directions

Powerful Mode

- For quick cooling or heating.

Sleep Mode

Delay ON Timer and OFF Timer

Automatic Restart Control

- Operation is restarted after power failure at previous setting mode.

Microcomputer-controlled Room Temperature Control

Outdoor Unit

Panasonic
INVERTER

- Breakdown Self Diagnosis Function
- Low Pressure Control (Gas Leakage Detection)
- Indoor Power Relay Control
- Automatic Restart Control
- Deodorizing Control
- Anti-Fog Discharge Control
- Anti Freezing Control
- Anti-Cold Draft Control
- Hot Start
- Intake Air Temperature Control
- High Pressure Control
- Standby Control
- Deice Operation

- Time Delay Safety Control
- 30 seconds Forced Operation
- High Pressure Control
- Total Running Current Control
- Compressor Overheating Prevention Control
- IPM (Power Transistor) Overheating Protection Control
- Low Operation Frequency Protection Control
- Mininum Operation Frequency Protection Control
- Outdoor Air Temperature Control
- Standby Control
- Deice Operation

※ Details can be refered to OPERATION DETAILS in this manual.

SAFETY PRECAUTIONS

Before operating, please read the following "Safety Precautions" carefully.

- To prevent personal injury, injury to others and property damage, the following instructions must be followed.
- Incorrect operation due to failure to follow instructions will cause harm or damage, the seriousness of which is classified as follow:

⚠ Warning

This sign warns of death or serious injury.

⚠ Caution

This sign warns of damage to property.

- The instructions to be followed are classified by the following symbols:

This symbol (with a white background) denotes an action that is PROHIBITED.

These symbols (with a black background) denote actions that are COMPULSORY.

■ Installation Precautions

⚠ Warning

- **Do not install, remove and reinstall the unit by yourself.** Improper installation will cause leakage, electric shock or fire. Please engage an authorized dealer or specialist for the installation work.

⚠ Caution

- **This room air conditioner must be earthed.** Improper grounding could cause electric shock.
- **Ensure that the drainage piping is connected properly.** Otherwise, water will leak out.

- **Do not install the unit in a potentially explosive atmosphere.** Gas leak near the unit could cause fire.

■ Operation Precautions

⚠ Warning

This sign warns of death or serious injury.

- Do not share outlet.
- Do not insert plug to operate the unit. Do not pull out plug to stop the unit.
- Do not operate with wet hands.
- Do not damage or modify the power cord.
- Do not insert finger or other objects into the indoor or outdoor units.
- Do not expose directly to cold air for a long period.

- Plug in properly.
- Use specified power cord.

- If abnormal condition (burnt smell, etc.) occurs, switch off and unplug the power supply.

⚠ Caution

This sign warns of injury.

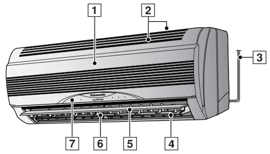
- Do not pull the cord to disconnect the plug.
- Do not wash the unit with water.
- Do not use for other purposes such as preservation.
- Do not use any combustible equipment at airflow direction.
- Do not sit or place anything on the outdoor unit.

- Switch off the power supply before cleaning.
- Ventilate the room regularly.
- Pay attention as to whether the installation rack is damaged after long period of usage.

- Switch off the power supply if the unit is not used for a long period.

NAME OF EACH PART

■ Indoor Unit



1 Front Panel

2 Air Intake Vent

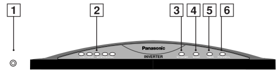
3 Power Supply Cord

4 Air Outlet Vent

5 Vertical Airflow Direction Louver

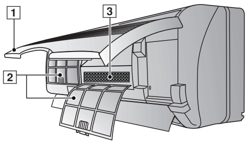
6 Horizontal Airflow Direction Louver

7 Indicator Panel



1 Auto Operation Button (when the front panel is opened)		
2 Power Monitor Lamps • Lights up from LOW to HIGH to show the compressor operating condition. • Light off when then compessor stops.	–	ORANGE
3 Power Indicator	–	GREEN
4 Sleep Mode Indicator	–	ORANGE
5 Timer Mode Indicator	–	ORANGE
6 Powerful Mode Indicator	–	ORANGE

● Indoor Unit
(when the front panel is opened)

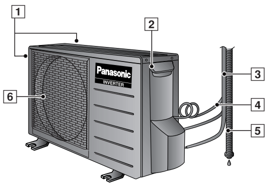


1 Front Panel

2 Air Filters

3 Air Purifying Filter

■ Outdoor Unit



1 Air Intake Vents

2 Ground Terminal
(Inside cover)

3 Piping

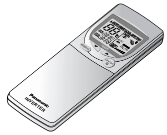
4 Connecting Cable

5 Drain Hose

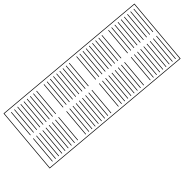
6 Air Outlet Vents

■ Accessories

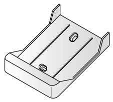
● Remote Control



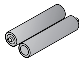
● Remote Control Indication Sticker



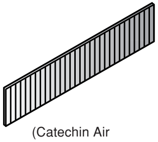
● Remote Control Holder



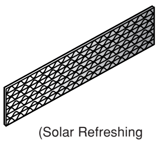
● Two RO3 (AAA) dry-cell batteries or equivalent



● Air Purifying Filter



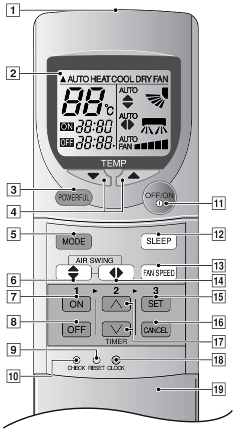
(Catechin Air Purifying Filter)



(Solar Refreshing Deodorizing Filter)

NAME OF EACH PART

■ Remote Control


1
2
AUTO HEAT COOL DRY FAN
AUTO
ON
OFF
AUTO FAN
TEMP
3
4
POWERFUL
OFF/ON
11
5
MODE
SLEEP
12
AIR SWING
FAN SPEED
13
6
14
7
ON
SET
15
8
OFF
CANCEL
16
TIMER
17
9
18
10
CHECK RESET CLOCK
19

- **Remote Control Signal.**
  - Make sure it is not obstructed.
  - Maximum distance : 10 m.
  - Signal received sound.
    One short beep or one long beep.

- **Notes for Remote Control.**
  - Do not throw or drop.
  - Do not get it wet.
  - Certain type of fluorescent lamps may affect signal reception. Consult your dealer.

1 Signal Transmitter

2 Operation Display

3 Powerful Mode Operation Button

4 Room Temperature Setting Button
(self-illuminating button)

5 Operation Mode Selection Button

6 Vertical Airflow Direction Button

7 ON-Timer Button

8 OFF-Timer Button

9 Reset Point
(Press with fine-tipped object to clear the memory)

10 Check Point
To be used by the service technician only.

11 OFF/ON Button
(self-illuminating button)

12 Sleep Mode Operation Button

13 Fan Speed Selection Button

14 Horizontal Airflow Direction Button

15 Timer Set Button

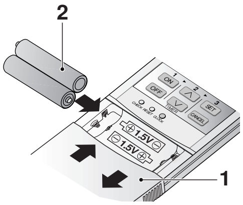
16 Timer Cancellation Button

17 Time-Setting Button

18 Clock Button

19 Remote Control Cover

- **How to Insert the Batteries**


2
1
ON
OFF
SET
CANCEL
CHECK RESET CLOCK
1.5V
1.5V

1 Slide down the remote control cover completely

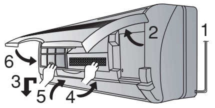
2 Insert the batteries
- Be sure the direction is correct
- 12.00 at display - flashing
- Set the current time (CLOCK) immediately to prevent battery exhaustion.

- **About the batteries**
  - Can be used for approximately one year.

- **Observe the following when replacing the batteries**
  - Replace with new batteries of the same type.
  - Do not use rechargeable batteries (Ni-Cd).
  - Remove the batteries if the unit is not going to be used for a long period.

PREPARATION BEFORE OPERATION

■ Indoor Unit



1 Connect the power supply cord to an independent power supply

2 Open the front panel

3 Remove the air filters

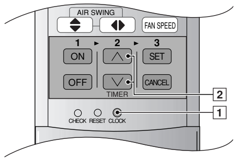
4 Fit the air purifying filters in place

5 Insert the air filters

6 Close the front panel

■ Remote Control

– To set the current time

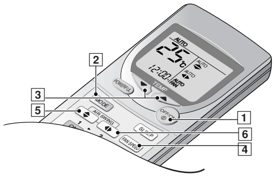

AIR SWING
FAN SPEED
1
2
3
ON
SET
OFF
CANCEL
TIMER
2
1
CHECK RESET CLOCK

1 Press 1.

2 Then press 2 to increase or decrease the time.

3 Press 1 again.
Set time at display will light up.

HOW TO OPERATE


2
3
5
1
6
4
AUTO
25
12:00
POWERFUL
MODE
SLEEP
FAN SPEED

■ To start the operation

- Press 1.
- POWER indicator (green) on the indoor unit will light up.
  (LED blinks when the room temperature is low at the start of heating or operation mode is selected during Automatic Operation.)
  The power monitor lamps light up to show the compressor operating condition.
- To stop, press once more.

■ Setting Mode

- Press 2 to select:-

HEAT – Heating Operation
COOL – Cooling Operation
DRY – Soft Dry Operation
FAN – Fan Operation
AUTO – Automatic Operation

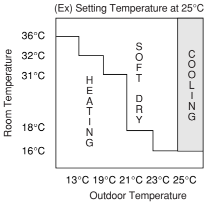
■ Setting Temperature

- Press 3 to increase or decrease the temperature.
- The temperature can be set between 16°C ~ 30°C.
  (Not adjustable during Fan Operation.)
- Recommended temperature:

HEAT : 20°C ~ 24°C
COOL : 26°C ~ 28°C
DRY : Approx. room temperature

■ Automatic Operation

- At the start of the Automatic operation, Heating, Cooling or Soft Dry is automatically selected according to the outdoor temperature, indoor temperature and setting temperature.
- The operation mode changes every half hour, when necessary.



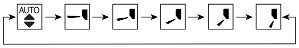
■ Setting the Fan Speed

- Press 4 to select:-
  There are five stages of fan speed in addition to Auto Fan speed.

AUTO
FAN – **Heating**
When the temperature of the discharge air increases, the fan speed increases.
Cooling ● Dry
Changes the fan speed to generate a cool breeze. The air starts to blow out approximately 40 seconds after the start of Cooling or Soft Dry.

■ Setting the Vertical Airflow Direction.

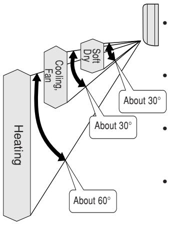
- Press 5 to select:-



AUTO
- For COOL/DRY operation.
  Swing up/down automatically.

AUTO
- For HEAT operation
  When the discharge air temperature is low such as at the start of the heating operation, the air blows at horizontal level. As the temperature rises, the hot air blows in a downwards direction.

● Louver adjustment range



- The adjustment range is different for each operation i.e. Heating, Cooling and Soft Dry. (Fig.at left)
- The angle indicated on the remote control is different from that on the indoor unit.
- The louver angle automatically changes to prevent condensation during Cooling and Soft Dry.
- When operation stops, the louver automatically closes.

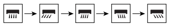
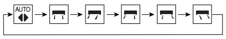
※ Five stages of adjustments can be made in this range.

● Notes

- Do not adjust the vertical airflow direction louver downward during Cooling and Soft Dry. Drops of water may condense on the air outlet vent and drip down.
- Use the remote control to change the vertical airflow direction louver. Using your hands to adjust the direction may cause the louver to malfunction. If this happens, stop operation immediately and restart.

■ Setting the Horizontal Airflow Direction.

- Press 6 to select:-

Horizontal Airflow Direction	Indoor Unit	
	Remote Control	

AUTO
- For COOL/DRY operation.
  Louvers swing horizontally at a fixed speed.

AUTO
- For HEAT operation
  When air temperature is low, air is sent in ▔. When temperature goes up, louver swing horizontally at a fixed speed.

● Use this air conditioner under the following conditions:

Unit in °C

DBT: Dry Bulb Temp WBT: Wet Bulb Temp	Indoor		Outdoor	
	DBT	WBT	DBT	WBT
Maximum Temperature-Cooling (Maximum Temperature-Heating)	32 (30)	23 (-)	43 (24)	26 (18)
Minimum Temperature-Cooling (Minimum Temperature-Heating)	16 (2)	11 (-)	16 (-5)	11 (-6)

● Notes

- If the unit is not going to be used for an extended period of time, turn off the main power supply. If it is left at the ON position, approximately 2.8 W of electricity will be used even if the indoor unit has been turned off with the remote control.
- When standby mode is activated, approximately 35 W of electric power will be consumed on the heat of compressor to warm up the room quickly. This mode can be switched off if you do not require it. Please consult your dealer.
- If operation is stopped, then restart immediately, the unit will resume operation only after 3 minutes.

● Operation Details

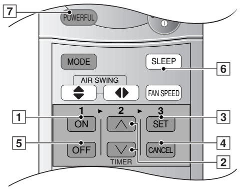
COOL – Cooling Operation
- To set the room temperature at your preference cooling comfort.

AUTO – Automatic Operation
- Sense indoor temperature to select the optimum mode.
- Temperature is not displayed on the remote control during AUTO operation.

DRY – Soft Dry Operation
- Dehumidifies while maintaining the setting temperature. The Soft Dry Operation is recommended during the rainy season.
- If the room temperature exceeds the setting temperature, operation switches to Cooling.
- The fan speed is rather slow during Soft Dry Operation.
- The humidity may not decrease when the indoor temperature is lower than the setting temperature on the remote control.

HEAT – Heating Operation
- To warm up the room temperature upon your preference setting temperature.
- Heat is obtained from outdoor air to warm up the room. When the outdoor ambient air temperature falls, the heating capacity of the unit might be reduced. We recommend that you use an additional heating device when the outdoor ambient air temperature is low.

FAN – FAN Operation
- Circulates air throughout the room.
- Purifies and deodorizes the air if the air purifying filter is used. Fan Operation is recommended during seasons in which neither Heating nor Cooling is used.



SETTING THE TIMER

Ensure that the current time is correct before setting the timer. The timer cannot be set if the time display is flashing.

■ ON-TIMER Operation

To start the air conditioner operation automatically.
- Press 1 to set the operation.
- Press 2 to increase or decrease the time.
- Then press 3.
- To cancel this operation, press 4.

■ OFF-TIMER Operation

To stop the air conditioner operation automatically.
- Press 5 to set the operation.
- Press 2 to increase or decrease the time.
- Then press 3.
- To cancel this operation, press 4.

● Timer Mode Operation Details

- When the ON-Timer is set, operation will start before the actual set time. This is to allow the room temperature to reach the setting temperature by the setting time. (Maximum of 35 minutes in advance).
- Once the timer is set, operation will start and stop at the same time everyday.
- The current time is not displayed when the timers are set.
- When both timers are used together, the TIMER mode indicator on the indoor unit remains lit even when the operation is stopped by the OFF-TIMER.

CONVENIENCE OPERATION

Powerful and Sleep modes are available for Automatic Operation, Heating, Cooling and Soft Dry.

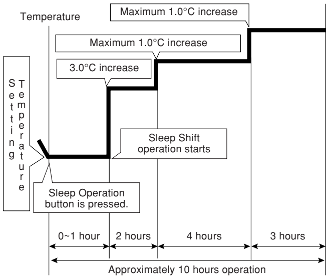
■ Sleep Mode Operation

To obtain a comfortable room temperature while sleeping:-
- Press 6.
- Sleep mode indicator on the indoor unit will light up.
- To cancel this operation, press once more.

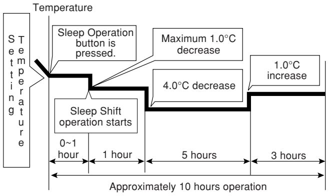
● Sleep Mode Operation Details

- When the room temperature reaches the set temperature, the airflow volume will change to low, automatically
- When used together with the timer, the timer has a priority.
- Air blows out gently during sleep.

- **For COOL/DRY operation.**



- **For HEAT operation**



■ Powerful Mode Operation

To obtain the set temperature quickly.
- Used in winter to warm yourself quickly upon returning home (Heating + Powerful).
- Used in summer to cool yourself after a hot bath (Cooling + Powerful).
- Press 7.

※ Powerful mode indicator (orange) on the indoor unit will light up.
- To cancel this operation, press once more.

● Note

- The setting temperature and the fan speed changes automatically in order to heat, cool or dehumidify the room quickly.
- The Powerful and Sleep modes can be set during Automatic Operation.

Operation		Temperature	Fan Speed
Automatic	HEAT	3.5°C higher	Slightly Stronger
	COOL	2°C lower (For first 20 minutes)	
	DRY	1°C lower (For first 20 minutes)	

CARE AND MAINTENANCE

■ Cleaning the Indoor Unit and Remote Control

- Wipe gently with a soft, dry cloth.
- Do not use water hotter than 40˚C or polishing fluid to clean the unit.

■ Cleaning the Air Filter

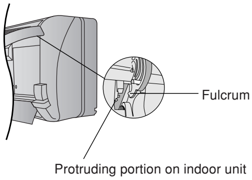
(Recommendation:- If the unit is operated in a dusty environment, clean the filters every two weeks, continuous use of this dirty filters will reduce cooling or heating efficiency)

1. Remove dirt using a vacuum cleaner.
2. Wash back of the air filter with water.
3. If badly soiled, wash it with soap or a mild household detergent.
4. Let it dry and reinstall it.
   Be sure the “FRONT” mark is facing you.
   ※ Damaged air filter.
   Consult the nearest authorized dealer.
   Part No.: CWD001047.
   - Do not use benzene, thinner, scouring powder or clothes soaked in caustic chemical to clean the unit.

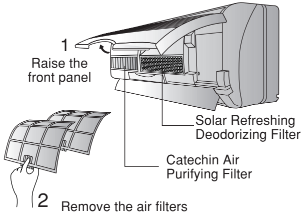
■ Cleaning the Front Panel

(Must be removed before washing)

1. Raise the front panel higher than the horizontal and pull to remove it.
2. Gently wash with water and a sponge.
   - Do not press the front panel too hard when washing.
   - When use kitchen cleaning fluid (neutral detergent), rinse throughly.
   - Do not dry the front panel under direct sunlight.
3. To fix the front panel, raise the front panel horizontally, match the protruding portion on the indoor unit to the fulcrum and push into place.



■ Air Purifying Filters


1
Raise the front panel
Solar Refreshing Deodorizing Filter
Catechin Air Purifying Filter
2
Remove the air filters

● Solar Refreshing Deodorizing Filter

- Used to remove unpleasant odour and deodorize the air in the room.
- Reusable.
- Vacuum, place under direct sunlight for 6 hours and fit it back in place.
  (Recommended : every 6 months)

● Catechin Air Purifying Filter

- The filter is coated with catechin to prevent growth of bacteria and viruses.
- Reusable.
- Vacuum and fit it back in place
  (Recommended : every 6 months)

- Recommended to change these filters every 3 years.
  Do not reuse damaged filters.
  Consult the nearest authorized dealer to purchase a new filter.
  Catechin Air Purifying Filter No.: CZ-SF70P
  Solar Refreshing Deodorizing Filter No.: CZ-SFD70P

- If you operate the air conditioner with dirty filters:-
  – Air is not purified
  – Cooling capacity decreases
  – Foul odour is emitted

■ Pre-season Inspection

- ● **Is the discharged air cold/warm?**
  Operation is normal if 15 minutes after the start of operation, the difference between the air intake and outlet vents temperature is:-

  COOL – 8°C or above
  HEAT – 14°C or above

- ● **Are the air intake or outlet vents of the indoor or outdoor units obstructed?**
- ● **Are the remote control batteries weak?**
  If the remote control display appears weak, replace the batteries.
- ● **Do not ignore a damaged installation rack.**
  A damaged rack may fall and cause injury. Consult an authorized dealer.

■ When the Air Conditioner is Not Used for an Extended Period of Time

1. To dry the internal parts of the indoor unit, operate the unit for 2 - 3 hours using:-

   FAN operation

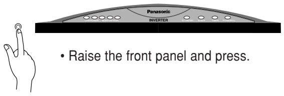
2. Turn off the power supply and unplug.
   Note: If the unit is not switched off by the remote control, it will start operating when you plug in (because the unit is equipped with Auto Restart Control).
3. Remove the remote control batteries.

■ Recommended Inspection

- After used over several seasons, the unit will become dirty and thus decreases the unit’s performance. Depending on the operation conditions, a dirty unit may produce odour and dust may pollute dehumidification system. Therefore, a seasonal inspection is recommended in addition to regular cleaning. (Consult an authorized dealer).

HELPFUL INFORMATION

■ Auto Operation Button



• Raise the front panel and press.

● Automatic Operation

- If the remote control fails to function or has been misplaced, press the Auto Operation button to start the Automatic operation.
- The Automatic operation will be activated immediately once the Auto operation button is pressed. However, temperature cannot be adjusted in this operation.
- The power indicator on the indoor unit will blink until the operation mode is selected automatically.
- To cancel this operation, press once more.

■ Auto Restart Control

- If there is a power failure, operation will be automatically restarted under the previous operation mode and airflow direction when power is resumed. (When the operation is not stopped by remote control).
- If you do not want the unit to restart automatically when power is resumed, switch off the power supply.
- If you do not require Auto Restart Control, consult your dealer.
- Auto Restart Control is not available when Timer or Sleep Mode is set.
- When the operation restarts, the outdoor unit will operate only after 3~4 minutes.

■ Timer Setting

- When power failure occurs, the timer setting will be cancelled. Once power is resumed, reset the timer.

■ Thunder and Lightning

- This air conditioner is equipped with a built-in surge protective device. However, in order to further protect your air conditioner from being damaged by abnormally strong lightning activity, you may switch off the main power supply and unplug from power socket.

■ Voltage fluctuation

- The outdoor unit stops operation frequently due to a fluctuation in the voltage. Consult your dealer.

ENERGY SAVING AND OPERATION HINTS

Here are some useful tips for optimum performance and cost-effective operation.

■ Setting the Temperature

- Approximately 10% of electricity can be saved.
- Set the temperature higher or lower than the desired temperature.

Cooling Operation : 1°C higher
Heating Operation : 2°C lower

■ Air Filters and Air Purifying Filters

- Clean the air filters every 2 weeks and the Air Purifying Filters every 6 months.
- Dirty filters may reduces cooling or heating efficiency.

■ Keep All Doors and Windows Closed

- Otherwise, cooling or heating performance will be reduced and electricity cost is wasted.

■ Outdoor Unit

- Do not block the air outlet vents. Otherwise, it will lower the cooling or heating performance.

■ Timer and Sleep Mode

- To prevent wastage of electricity, use sleep mode when sleeping or Timer when going out.

■ Avoid Direct Sunlight

- Keep curtains or drapes closed to avoid direct sunlight during cooling operation.

■ Do not overcool!

- A difference of 6°C or less between the outdoor and indoor temperatures during cooling is ideal. Anything cooler may harm your health.

TROUBLESHOOTING

Before calling your dealer, refer to the checklist

Problem?	Check
The unit does not operate	• Has a circuit breaker been tripped or a fuse blown? • Is the power supply plug disconnected from the outlet? • Is the Timer being used correctly?
The unit does not cool or heat effectively	• Has the temperature been set correctly? • Are the air filters dirty? • Are the air intake or outlet vents blocked? • Are all the windows and doors closed? ※ Measure the temperature difference. Operation is normal if, 15 minutes after the start of operation, the temperature difference between the air intake and outlet vents is 8°C or above for cooling and 14°C or above for heating.
The unit does not receive remote control signals, or the remote control display is weak or non-existent	• Are the batteries weak? • Have the batteries been inserted with the ⊕ and ⊖ poles in the correct position?

Problem?	Reason
Air is not discharged immediately	• At Cooling • Soft Dry (auto Fan Speed) Air will not be discharged for approximately 40 seconds. The unit is designed to prevent tobacco, cooking and body odors from being discharged together with the cool air. • At Heating (POWER LED blinks) This is to prevent cold air from blowing out. Please wait.
Operation stops suddenly	• At Cooling • Soft Dry (auto Fan Speed) The indoor fan repeatedly stops for 80 seconds and operates for 20 seconds to check the indoor temperature. Whenever the temperature reaches the setting temperature, operation starts again. • At Heating (POWER LED blinks) When the outdoor temperature is low and humidity is high, frost accumulates on the outdoor unit. The POWER LED blinks when the unit is melting the frost. (Please wait as defrosting may take up to 10 minutes.)
Fog is blowing out from the unit	• This occurs when the airflow from the air conditioner cools the room.
There is a noise	• A 'passt' sound is heard during defrosting or when the air conditioner operation has been stopped. This is caused by the refrigerant inside the air conditioner flowing in the opposite direction. • The air conditioner will expand or contract due to changes in temperature, causing a cracking sound. • The sound of water flowing is caused by the refrigerant flowing inside the unit.
The outdoor unit gives off water and steam	• When defrosting, the frost melts and changes to water and steam.

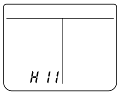
■ Call the Dealer Immediately

If the following conditions occur, turn off and unplug the main power supply, and then call the dealer immediately.

- **Abnormal noise is heard during operation.**
- **Water or foreign material gets into the remote control by mistake.**
- **Water leak from the indoor unit.**
- **Switches or buttons do not operate properly.**
- **Circuit breaker trips or fuse blows frequently.**
- **Power supply cord and plug become unusually warm.**
- **A smell of burning is emitted.**

■ When the Timer LED at indoor unit blinks

The Timer LED blinks indicating abnormality.
Press the check button at remote control for 5 seconds, error code will be displayed.



Remote Control Display.

Press TIMER △ or ▽ button to identify the error code.
Beep sound (4 times) will be heard for the correct error code shown.
Turn off the power supply and remove the power supply plug.
Inform the error code to an authorised dealer.

- **Depending on which 3 characters are displayed, temporary operation may be possible.**

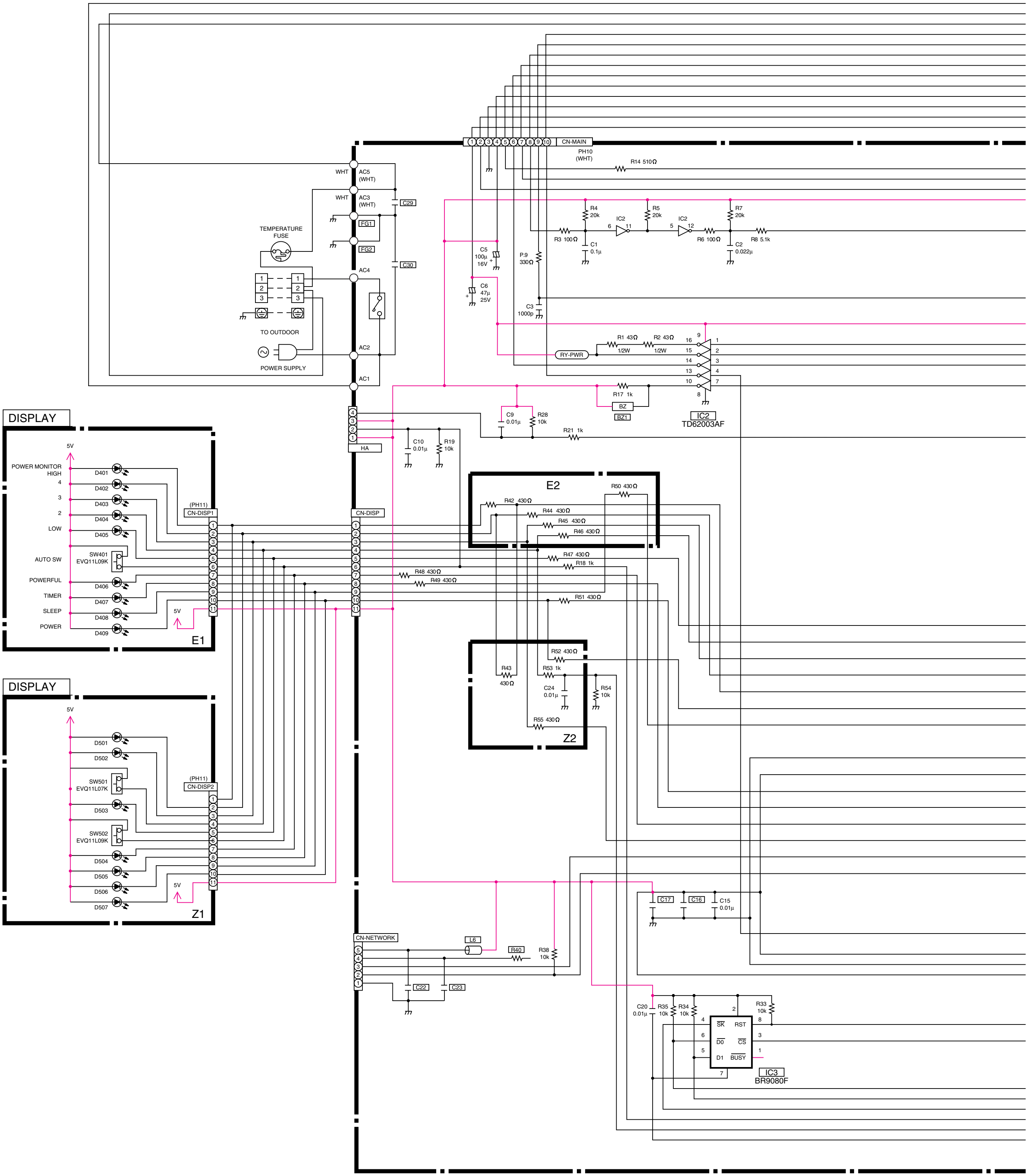
Characters allowing temporary operation	Possible temporary operations	Description of operation
H23	Cooling	Emergency operation with limited functions. (The Timer LED continues to blink.)
H27	Heating	
H28	Cooling	

● Temporary operation

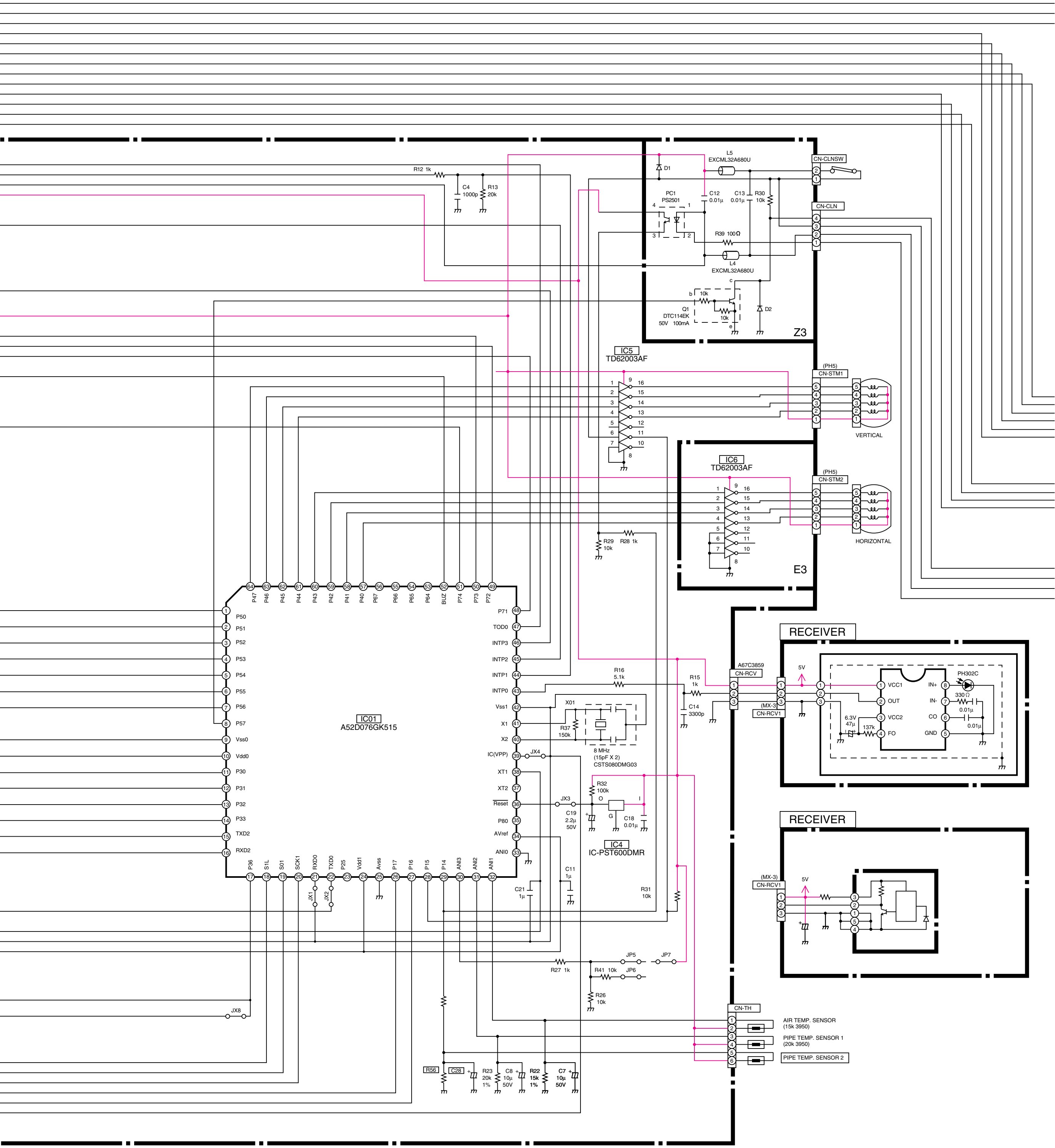
1. Press the (MODE) button and select Heating or Cooling.
2. Press the operation OFF/ON button ('beep! beep! beep! beep!' sound is heard).
   ※ Use this operation temporarily, until repairs can be made.

• CS-E9BKP / CU-E9BKP5

SCHEMATIC DIAGRAM 1/3

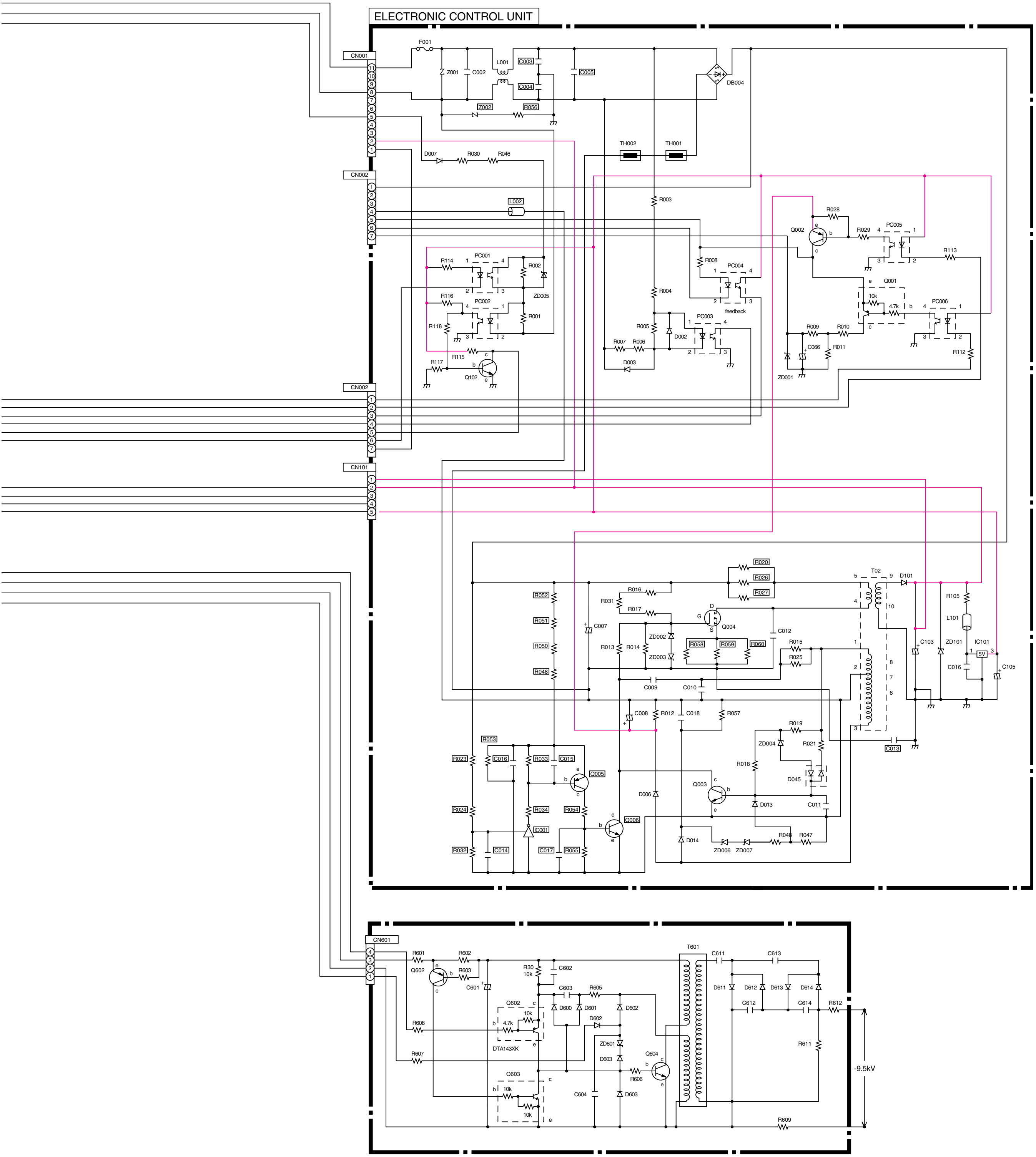

CN-MAIN
PH10
(WHT)
R14 510Ω
WHT
AC5
(WHT)
WHT
AC3
(WHT)
C29
FG1
FG2
C30
TEMPERATURE
FUSE
AC4
AC2
AC1
TO OUTDOOR
POWER SUPPLY
R4
20k
R5
20k
R7
20k
IC2
IC2
R3 100Ω
R6 100Ω
R8 5.1k
C1
0.1µ
C2
0.022µ
C5
100µ
16V
C6
47µ
25V
P.9
330Ω
C3
1000p
R1 43Ω
R2 43Ω
1/2W
1/2W
RY-PWR
R17 1k
BZ
BZ1
IC2
TD62003AF
C9
0.01µ
R28
10k
R21 1k
HA
C10
0.01µ
R19
10k
DISPLAY
5V
POWER MONITOR
HIGH
4
3
2
LOW
AUTO SW
POWERFUL
TIMER
SLEEP
POWER
D401
D402
D403
D404
D405
SW401
EVQ11L09K
D406
D407
D408
D409
(PH11)
CN-DISP1
5V
E1
CN-DISP
E2
R50 430Ω
R42 430Ω
R44 430Ω
R45 430Ω
R46 430Ω
R47 430Ω
R18 1k
R48 430Ω
R49 430Ω
R51 430Ω
R52 430Ω
R43
430Ω
R53 1k
C24
0.01µ
R54
10k
R55 430Ω
Z2
DISPLAY
5V
D501
D502
SW501
EVQ11L07K
D503
SW502
EVQ11L09K
D504
D505
D506
D507
(PH11)
CN-DISP2
5V
Z1
CN-NETWORK
L6
R40
R38
10k
C22
C23
C17
C16
C15
0.01µ
C20
0.01µ
R35
10k
R34
10k
R33
10k
SK
RST
D0
CS
D1
BUSY
IC3
BR9080F

SCHEMATIC DIAGRAM 2/3



IC01
A52D076GK515
P50
P51
P52
P53
P54
P55
P56
P57
Vss0
Vdd0
P30
P31
P32
P33
TXD2
RXD2
P71
TOD0
INTP3
INTP2
INTP1
INTP0
Vss1
X1
X2
IC(VPP)
XT1
XT2
Reset
P80
AVref
ANI0
P47
P46
P45
P44
P43
P42
P41
P40
P67
P66
P65
P64
BUZ
P74
P73
P72
P36
S1L
S01
SCK1
RXD0
TXD0
P25
Vdd1
Avss
P17
P16
P15
P14
ANI3
ANI2
ANI1
R12 1k
C4 1000p
R13 20k
L5 EXCML32A680U
D1
PC1 PS2501
C12 0.01µ
C13 0.01µ
R30 10k
R39 100Ω
L4 EXCML32A680U
Q1 DTC114EK 50V 100mA
10k
D2
Z3
CN-CLNSW
CN-CLN
IC5
TD62003AF
IC6
TD62003AF
(PH5) CN-STM1
VERTICAL
(PH5) CN-STM2
HORIZONTAL
E3
R29 10k
R28 1k
R16 5.1k
R15 1k
C14 3300p
X01
R37 150k
8 MHz (15pF X 2) CSTS080DMG03
JX4
JX3
R32 100k
C19 2.2µ 50V
C18 0.01µ
IC4
IC-PST600DMR
C11 1µ
C21 1µ
R31 10k
JX1
JX2
JX8
JP5
JP7
JP6
R27 1k
R41 10k
R26 10k
R56
C28
R23 20k 1%
C8 10µ 50V
R22 15k 1%
C7 10µ 50V
A67C3859 CN-RCV
(MX-3) CN-RCV1
RECEIVER
5V
VCC1
OUT
VCC2
FO
IN+
IN-
CO
GND
PH302C
330Ω
0.01µ
6.3V 47µ
137k
CN-TH
AIR TEMP. SENSOR (15k 3950)
PIPE TEMP. SENSOR 1 (20k 3950)
PIPE TEMP. SENSOR 2

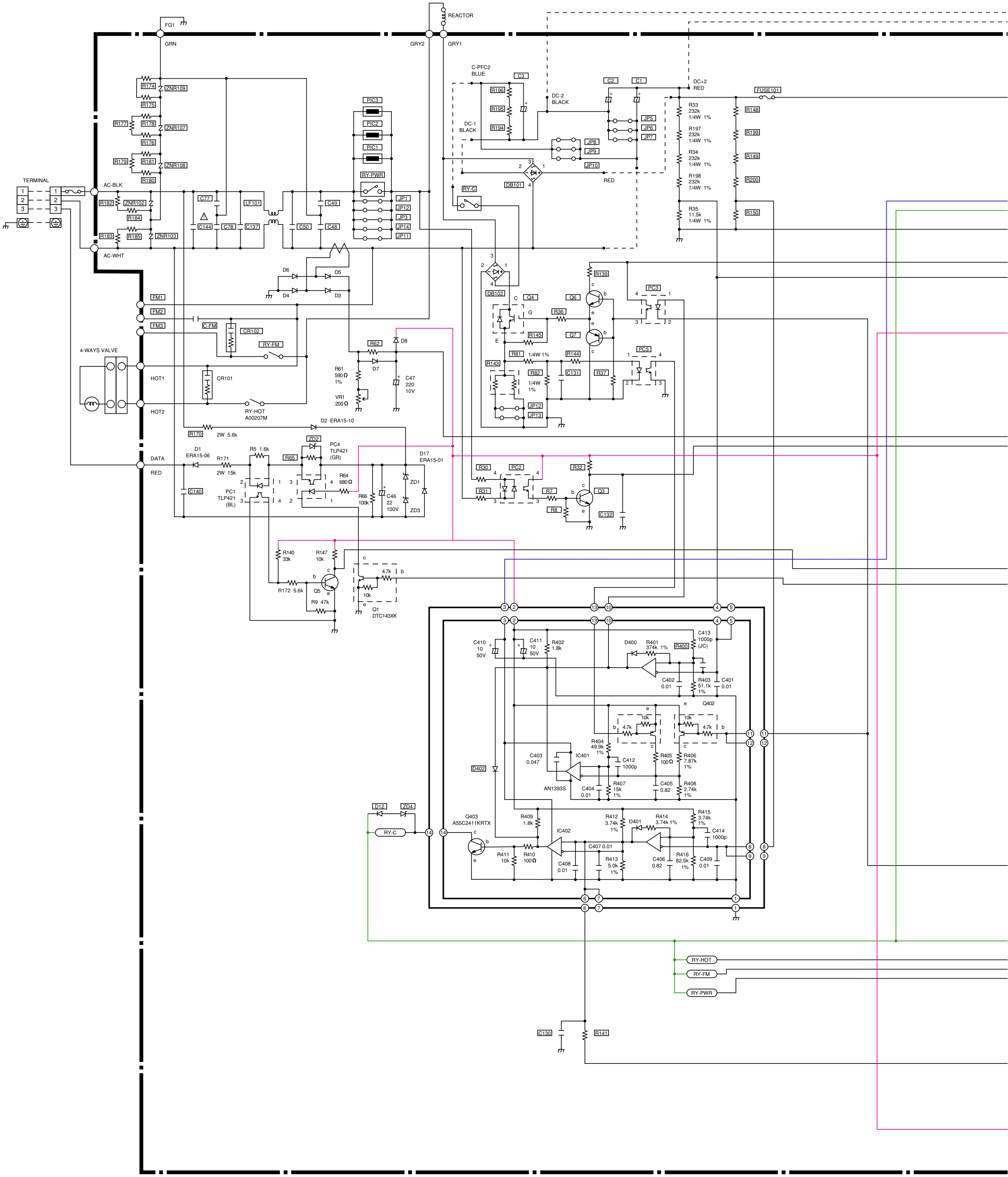
SCHEMATIC DIAGRAM 3/3



ELECTRONIC CONTROL UNIT
CN001
11
10
9
8
7
6
5
4
3
2
1
F001
Z001
C002
L001
C003
C004
C005
DB004
Z002
R056
D007
R030
R046
TH002
TH001
CN002
1
2
3
4
5
6
7
L002
R003
R028
Q002
e
b
c
R029
PC005
4
1
3
2
R113
PC001
R114
1
4
R002
2
3
ZD005
R116
PC002
4
1
R001
R118
3
2
R115
R117
c
b
Q102
e
R008
PC004
1
4
2
3
feedback
R004
R005
PC003
1
4
D002
2
3
R007
R006
D003
Q001
e
10k
4.7k
b
c
PC006
4
1
3
2
R009
R010
C066
R011
ZD001
R112
CN002
1
2
3
4
5
6
7
CN101
1
2
3
4
5
R020
R026
R027
R016
R031
R017
D
G
Q004
S
C012
T02
5
9
D101
4
10
R105
L101
R052
R051
R050
R048
C007
ZD002
R013
R014
ZD003
R058
R059
R060
R015
R025
1
2
8
7
6
3
C103
ZD101
IC101
1
3
5V
C016
C105
C009
C010
C008
R012
C018
R057
R019
ZD004
R021
C013
R053
R023
C016
R033
C015
Q005
e
b
c
R018
D045
Q003
c
b
e
D006
D013
C011
R024
R034
R054
IC001
c
b
Q006
e
R032
C014
C017
R055
D014
ZD006
ZD007
R048
R047
CN601
4
3
2
1
R601
R602
Q602
e
b
c
R603
C601
R30
10k
C602
T601
C611
C613
C603
R605
D600
D601
D602
D611
D612
D613
D614
Q602
c
10k
b
4.7k
e
DTA143XK
D602
C612
C614
R612
R608
ZD601
R611
R607
D603
Q604
b
c
e
R606
-9.5kV
Q603
c
b
10k
10k
e
C604
D603
R609

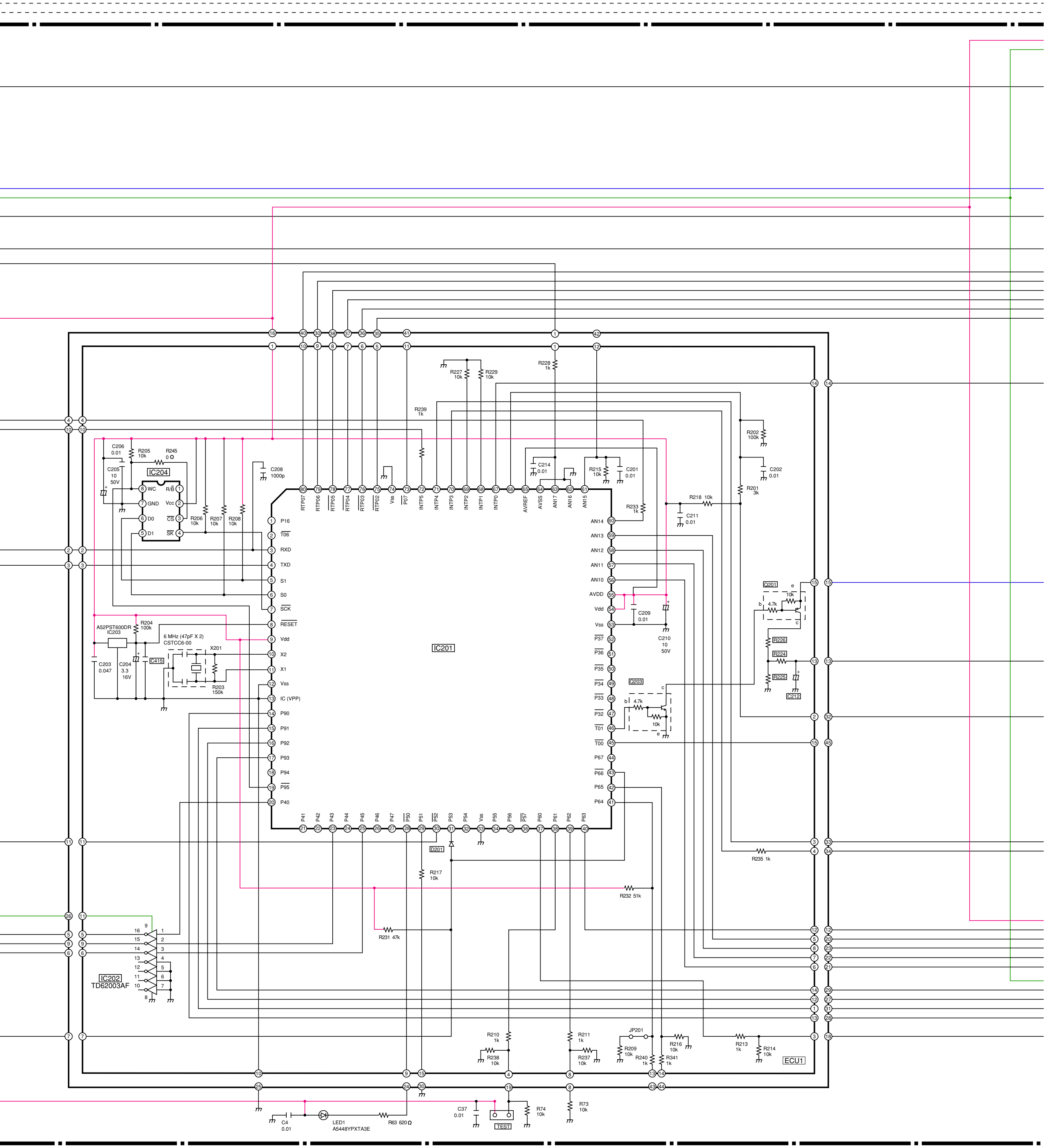
• CS-E12BKP / CU-E12BKP5

SCHEMATIC DIAGRAM 1/3

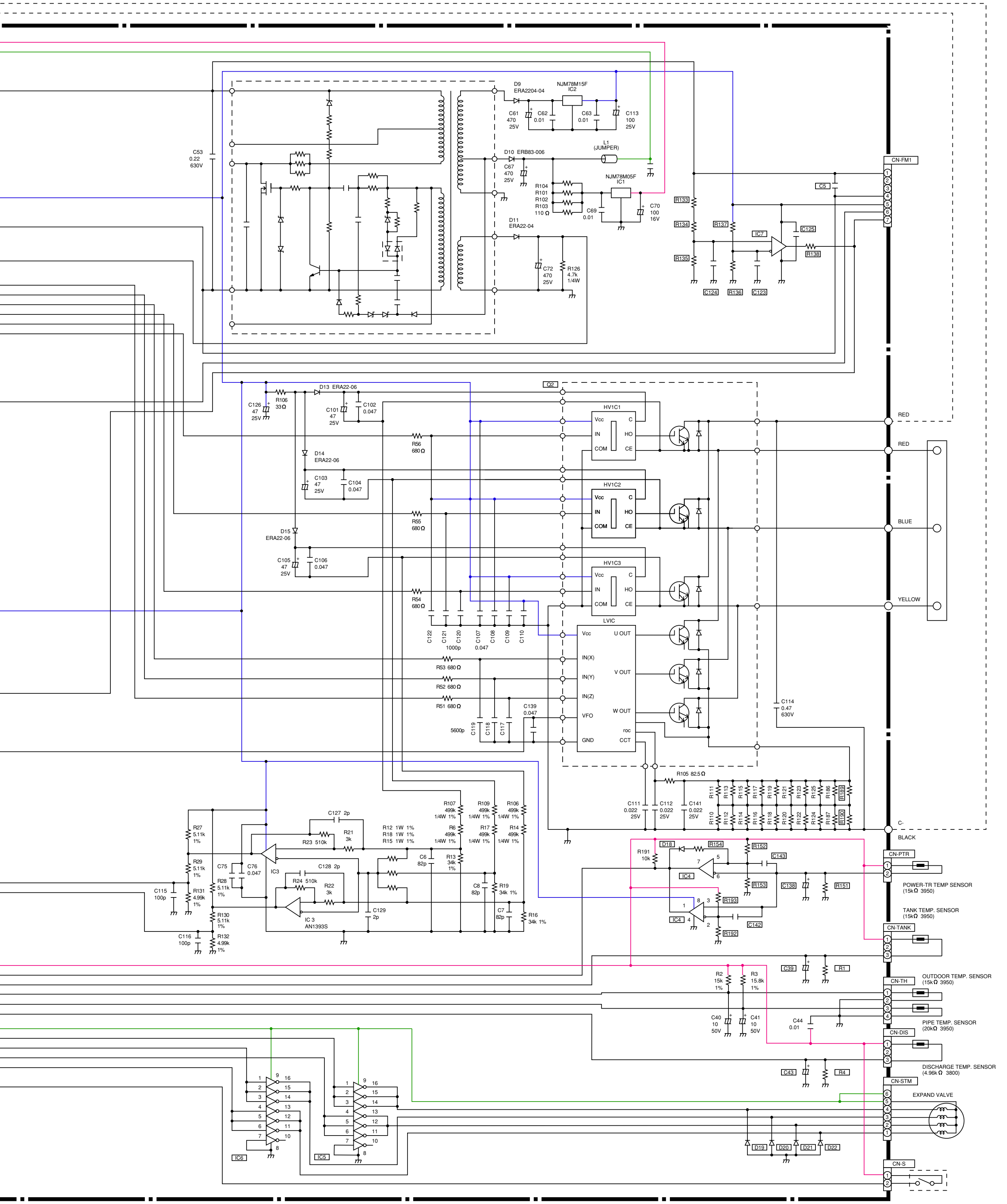


REACTOR
FG1
GRN
GRY2
GRY1
C-PFC2
BLUE
C3
C2
C1
DC+2
RED
FUSE101
DC-2
BLACK
DC-1
BLACK
R196
R195
R194
JP5
JP6
JP7
JP8
JP9
JP10
DB101
RED
R33
232k
1/4W 1%
R197
232k
1/4W 1%
R34
232k
1/4W 1%
R198
232k
1/4W 1%
R35
11.5k
1/4W 1%
R148
R199
R149
R200
R150
R174
ZNR109
R175
R177
R178
ZNR107
R176
R179
R181
ZNR108
R180
TERMINAL
AC-BLK
AC-WHT
R182
ZNR102
R184
R183
R185
ZNR103
C77
C144
C78
LF101
C137
C50
C49
C48
PIC3
PIC2
PIC1
RY-PWR
JP1
JP12
JP3
JP14
JP11
RY-C
D6
D5
D4
D3
DB102
Q4
Q6
R139
PC3
R36
R145
Q7
R81
1/4W 1%
R144
PC5
R143
R82
1/4W
1%
C131
R37
JP12
JP13
FM1
FM2
FM3
C-FM
CR102
RY-FM
4-WAYS VALVE
HOT1
CR101
HOT2
RY-HOT
A00207M
R62
D8
D7
R61
590Ω
1%
VR1
200Ω
C47
220
10V
R170
2W 5.6k
D2 ERA15-10
DATA
RED
D1
ERA15-06
R171
2W 15k
C140
R5 1.6k
R65
ZD2
PC4
TLP421
(GR)
PC1
TLP421
(BL)
R64
680Ω
R66
100k
C46
22
100V
D17
ERA15-01
ZD1
ZD3
R30
PC2
R31
R7
R8
R32
Q3
C132
R140
33k
R147
10k
Q5
R172 5.6k
R9 47k
4.7k
10k
Q1
DTC143XK
C410
10
50V
C411
10
50V
R402
1.8k
D400
R401
374k 1%
R400
C413
1000p
(JC)
C402
0.01
R403
51.1k
1%
C401
0.01
Q402
4.7k
10k
R404
49.9k
1%
C403
0.047
IC401
AN1393S
C412
1000p
R405
100Ω
R406
7.87k
1%
C404
0.01
R407
15k
1%
C405
0.82
R408
2.74k
1%
D402
D12
ZD4
RY-C
Q403
A55C2411KRTX
R409
1.8k
IC402
R412
3.74k
1%
D401
R414
3.74k 1%
R415
3.74k
1%
C414
1000p
R411
10k
R410
100Ω
C408
0.01
C407 0.01
R413
5.0k
1%
C406
0.82
R416
82.5k
1%
C409
0.01
RY-HOT
RY-FM
RY-PWR
C130
R141

SCHEMATIC DIAGRAM 2/3


IC201
IC202
TD62003AF
IC203
A52PST600DR
IC204
WC
R/B
GND
Vcc
D0
CS
D1
SK
X201
6 MHz (47pF X 2)
CSTCC6-00
Q201
Q203
D201
LED1
A5448YPXTA3E
JP201
TEST
ECU1
C415
C212
R226
R224
R225
C201 0.01
C202 0.01
C203 0.047
C204 3.3 16V
C205 10 50V
C206 0.01
C208 1000p
C209 0.01
C210 10 50V
C211 0.01
C214 0.01
C4 0.01
C37 0.01
R201 3k
R202 100k
R203 150k
R204 100k
R205 10k
R206 10k
R207 10k
R208 10k
R209 10k
R210 1k
R211 1k
R213 1k
R214 10k
R215 10k
R216 10k
R217 10k
R218 10k
R227 10k
R228 1k
R229 10k
R231 47k
R232 51k
R233 1k
R235 1k
R237 10k
R238 10k
R239 1k
R240 1k
R245 0 Ω
R341 1k
R63 620 Ω
R73 10k
R74 10k
4.7k
10k
RTP07
RTP06
RTP05
RTP04
RTP03
RTP02
Vss
P07
INTP5
INTP4
INTP3
INTP2
INTP1
INTP0
AVREF
AVSS
AN17
AN16
AN15
AN14
AN13
AN12
AN11
AN10
AVDD
Vdd
Vss
P37
P36
P35
P34
P33
P32
T01
T00
P67
P66
P65
P64
P16
T06
RXD
TXD
S1
S0
SCK
RESET
Vdd
X2
X1
Vss
IC (VPP)
P90
P91
P92
P93
P94
P95
P40
P41
P42
P43
P44
P45
P46
P47
P50
P51
P52
P53
P54
Vss
P55
P56
P57
P60
P61
P62
P63

SCHEMATIC DIAGRAM 3/3



D9
ERA2204-04
NJM78M15F
IC2
C61
470
25V
C62
0.01
C63
0.01
C113
100
25V
L1
(JUMPER)
D10 ERB83-006
C67
470
25V
NJM78M05F
IC1
R104
R101
R102
R103
110 Ω
C69
0.01
C70
100
16V
D11
ERA22-04
C72
470
25V
R126
4.7k
1/4W
C53
0.22
630V
CN-FM1
1
2
3
4
5
6
7
C5
R133
R134
R137
IC7
C125
R138
R135
C124
R136
C123
Q2
D13 ERA22-06
R106
33Ω
C126
47
25V
C101
47
25V
C102
0.047
HV1C1
Vcc
IN
COM
C
HO
CE
R56
680 Ω
D14
ERA22-06
C103
47
25V
C104
0.047
HV1C2
R55
680 Ω
D15
ERA22-06
C105
47
25V
C106
0.047
HV1C3
R54
680 Ω
RED
RED
BLUE
YELLOW
C122
C121
C120
1000p
C107
C108
0.047
C109
C110
LVIC
Vcc
U OUT
IN(X)
IN(Y)
IN(Z)
V OUT
W OUT
VFO
GND
roc
CCT
R53 680 Ω
R52 680 Ω
R51 680 Ω
C119
5600p
C118
C117
C139
0.047
C114
0.47
630V
R105 82.5 Ω
C111
0.022
25V
C112
0.022
25V
C141
0.022
25V
R111
R113
R115
R117
R119
R121
R123
R125
R186
R189
R110
R112
R114
R116
R118
R120
R122
R124
R187
R190
C-
BLACK
R107
499k
1/4W 1%
R109
499k
1/4W 1%
R106
499k
1/4W 1%
R12 1W 1%
R18 1W 1%
R15 1W 1%
R6
499k
1/4W 1%
R17
499k
1/4W 1%
R14
499k
1/4W 1%
C127 2p
R21
3k
R23 510k
R27
5.11k
1%
R29
5.11k
1%
C75
C76
0.047
IC3
C128 2p
R24 510k
R22
3k
R28
5.11k
1%
R131
4.99k
1%
C115
100p
R130
5.11k
1%
R132
4.99k
1%
C116
100p
IC 3
AN1393S
C129
2p
C6
82p
R13
34k
1%
C8
82p
R19
34k 1%
C7
82p
R16
34k 1%
D18
R154
R152
R191
10k
C143
IC4
R153
C138
R151
R193
IC4
C142
R192
CN-PTR
1
2
POWER-TR TEMP SENSOR
(15kΩ 3950)
TANK TEMP. SENSOR
(15kΩ 3950)
CN-TANK
1
2
3
C39
R1
R2
15k
1%
R3
15.8k
1%
CN-TH
1
2
3
4
OUTDOOR TEMP. SENSOR
(15kΩ 3950)
C40
10
50V
C41
10
50V
C44
0.01
PIPE TEMP. SENSOR
(20kΩ 3950)
CN-DIS
1
2
3
DISCHARGE TEMP. SENSOR
(4.96kΩ 3800)
C43
R4
CN-STM
6
5
4
3
2
1
EXPAND VALVE
D19
D20
D21
D22
IC6
IC5
CN-S
1
2